DOCUMENT RESUME

ED 418 908 SO 028 729

AUTHOR	Gersmehl, Philip J.
TITLE	Why Not Here? Teaching Geography to a New Standard.
INSTITUTION	National Council for Geographic Education.
ISBN	ISBN-1-884136-09-0
PUB DATE	1996-00-00
NOTE	262p.; "With cartography and research by Althea Melisse Willette and Clay Mering and a chapter on sources by Darrell Napton."
PUB TYPE	Guides - Non-Classroom (055)
EDRS PRICE	MF01/PC11 Plus Postage.
DESCRIPTORS	Community; Elementary Secondary Education; *Geographic Concepts; *Geographic Location; *Geography; *Geography Instruction; Global Education; Social Studies; Standards

ABSTRACT

This booklet is designed to help teachers in geography instruction, dealing with "where" things are located, "why" they are located there, and "what" difference their location makes. The first three chapters describe a spatial perspective, examine two different kinds of maps, and examine how geography deals with three strands of meaning at the same time. Each chapter uses maps or diagrams to illustrate the points in the text. Activities are designed to provide examples for a book on teaching geography, not a stand-alone course. Chapters are: (1) Introduction; (2) "One Perspective: A Way of Looking at the World"; (3) "Two Blades of a Scissors: A Cooperative 'Split' within Geography"; (4) "Three Strands of Meaning: Cognitive Psychology and Geography"; (5) "Four Cornerstones: Foundation Ideas of Geography"; (6) "Five Themes of Geography: Meeting the Standards"; (7) "A Four-Wheeled Cart: Resistance to Educational Change"; (8) "Three Kinds of Tests for Three Kinds of Meaning"; (9) "Pairs of Tools, Working with Each Other"; and (10) "A Single Discipline: A Window on the World." (EH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 418 908

Why Not Here?

Teaching Geography to a New Standard

PERMISSION TO REPRODUCE AND
DISSEMINATE THIS MATERIAL
HAS BEEN GRANTED BY
Philip Gersmehl
TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

Gersmehl
National Council
for
Geographic Education

SO 028 729

BEST COPY AVAILABLE

1996

National Council for Geographic Education Officers 1996
James F. Marran, President, Wilmette, Illinois
Edward A. Fernald, Past President, Florida State University
David A. Lanegran, Vice President, Curriculum and Instruction, Macalester College, Minnesota
Gail Hobbs, Vice President, Curriculum and Instruction, Pierce College, California
Donald J. Zeigler, Vice President, Research and External Relations, Old Dominion University, Virginia
Martha B. Sharma, Vice President, Publications and Products, National Cathedral School, Washington, DC
Celeste J. Fraser, Vice President, Finance, Wilmette, Illinois
Sandra Pritchard, Recording Secretary, West Chester University, Pennsylvania
Ruth I. Shirey, Executive Director, Indiana University of Pennsylvania

National Council for Geographic Education
16A Leonard Hall
Indiana University of Pennsylvania
Indiana, Pennsylvania 15705

Why Not Here?

Teaching Geography to a New Standard

Philip J. Gersmehl
University of Minnesota

with cartography and research by

Althea Melisse Willette

and

Clay Mering

and a chapter on sources by

Darrell Napton
South Dakota State University

1996

To Herbert Gross,

who once asked a class
if there were fjords
here,
at this place
on this map,

and then gasped
for dramatic effect
when they answered
correctly;

those who were there
know what it was like
to learn from a master.

Many people have contributed to this book in many ways. The list of people I am indebted to includes Carolyn Anderson, Eric Anderson, Clark Archer, Chandra Balachandran, Sarah Bednarz, Jerry Benson, Mark Bockenhauer, Elaine Bosowski, Osa Brand, Dwight Brown, Jae-Heon Choi, Greg Chu, Bryce Decker, Charlie Fitzpatrick, Larry Ford, Carol Gersmehl, Herold Gersmehl, Louise Gersmehl, Paul Hanson, James Harrington III, J. Fraser Hart, A. David Hill, Sidney Jumper, William Kammrath, Cary Komoto, Charles Kovacik, Raymond Krishchyunas, Hsiang-te Kung, David Lanegran, Mui Le, Ann Lewandowski, Pierce Lewis, Catherine Lockwood, Gail Ludwig, Jim Marran, Clay Mering, Judith Meyer, Peter Muller, Shuichi Nakayama, Darrell Napton, Alexei Naumov, Harris Payne, Jerry Pitzl, Milton Rafferty, Karl Raitz, Merrill Ridd, Sergei Rogachev, Carlos Ruiz-Rodriguez, Cathy Riggs Salter, Ted Schmudde, Leonid Smirnyagin, Everett Smith, Joseph Stoltman, John Tichy, Fumio Wada, Fred Walk, Stephen White, Brenda Whitsell, Althea Willette, and Jim Young.

Comments about anything that is in this manual (or should be!) are welcome at any time: please send them to:

Phil Gersmehl,
Department of Geography,
University of Minnesota,
Minneapolis, MN 55455

Copyright 1996 by Philip J. Gersmehl; a classroom teacher may make one copy of each transparency master for use in his/her own classrooms; except for that fair use, all rights are reserved -- do not quote or make any copy by any means without written permission.

ISBN 1-884136-09-05

Table of Contents

0 -- Introduction: Before we start
    Postscript: an optional note about student activities

1 -- One perspective: a way of looking at the world
    Postscript: about levels and standards

2 -- Two blades of a scissors: a cooperative "split" within geography
    Table: design principles for take-home worksheets and projects

3 -- Three strands of meaning: cognitive psychology and geography
    Postscript: about those taxonomies of learner outcomes
    Tables: design principles for slides, transparencies, etc.

4 -- Four cornerstones: foundation ideas of geography

5 -- Five themes of geography: meeting the standards
    Postscript: National Geography Standards, grades K-12

6 -- A four-wheeled cart: resistance to educational change

7 -- Three kinds of tests for three kinds of meaning

8 -- Pairs of tools, working with each other
    Postscript: about computers in geographic education

9 -- A single discipline: a window on the world

Appendices

    Sources of information about local areas

    Key geographic facts everyone should know
        (a short list for geographical literacy)

    Overhead Transparency Masters
        (grouped together to facilitate making transparencies,
        with outlines for student activities on the back)

    Glossary/Index

Why do we study geography?

To find out why
something we know "for sure,"
here,
is wrong,
over there,

and why
something that works for someone else,
where they are,
won't necessarily work for us,
here.

0

INTRODUCTION:
BEFORE WE START

A Los Angeles policeman abruptly stops the car, takes out his pistol, and checks the safety. He puts the pistol in his lap, with the muzzle aimed out through a marked area in the reinforced door. Then, seeing a "more than mildly concerned" expression on the face of his tour passenger (me!), he says:

"You're along to learn about graffiti code? how gangs tag their territory? Let's review: what does that asterisk over there mean?"

"The wrong person going beyond that bridge could get killed?"

"Right. Well, look farther to the right. That's my badge number, with the kill sign on it. It's been there awhile, and it's probably just bluff, but why take chances?"

Like barbed-wire fences in Kansas or mine-perimeter signs in West Virginia, the graffiti on the wall are **territorial markers**, physical signs on the landscape to warn people that the area behind the sign is different in some way. Usually, there are particular kinds of behavior that are expected (or not allowed) in that marked area.

Territorial markers --

Landscape features
that mark areas
where particular
kinds of behavior
are appropriate

A month later, near the Blue Metro line in Washington, DC, I asked what some graffiti meant. The answer: "nothing much; we don't mark territory the same way here as they do in LA."

Geography emerged because people need a way to organize, teach, and learn what is appropriate in a given place. Geography tells you how to dress -- for the climate, for the company, for the culture. Like a book of etiquette, it can be trivial or extremely important, depending on what content is chosen and how it is taught.

About here, some self-styled "reformers" would say, "see, this is the 'new' geography, and it's not about memorizing state capitals." But in fact, geography is about capitals, among other things, because capitals are among the key places where people make rules and mark territory. To do that well, citizens and their representatives must know about truth, time, and space:

Truth, time, and place

Some truths change (and others stay the same) from one time to another. Learning why is the goal of history, and it is important. As an old adage says, people who are ignorant of history are condemned to repeat mistakes.

Some truths change (and others stay the same) from one place to another. Learning why is the goal of geography. People who remain ignorant may do the wrong thing in the right place, or the right thing in the wrong place.

Of course, people can also study history and geography because they are interesting and fun! Exploratory curiosity is as important as practical applications in justifying a study of geography.

In an age of tight budgets and competing demands, however, it is difficult to argue in favor of teaching a subject unless it appears to have a clear value to students, parents, and school boards. It pays, therefore, to follow a variant of old scout motto: be prepared, at any time, to explain why it is important to learn geography.

Sermonettes on the practical value of geography

We assume you are reading this book because you are interested in teaching geography. Given that prior interest, you probably do not need to be reminded why a geographic perspective is important in everyday life.

One might also assume, however, that you have to deal with students, parents, colleagues, and administrators. Some of these people may think that geography is a trivia game or elementary-school subject. To them, geography consists primarily (pun intended) of knowing the names of the capitals, rivers, and mountains in each country of the world.

If you have to deal with that kind of audience, your personal collection of convincing rationales might wear thin after awhile. In that case, you may find a use for some of the rationales that we have devised (or borrowed) over the years. For that reason, we put a fair number of illustrations of practical geography into this book; feel free to ignore them if they don't fit your mood on a given day.

In that spirit, here is a local rationale for geography:

> Geography is about the locations of things. Students (present and future business-people, voters, and elected officials) should learn how to arrange buildings, roads, parks, election districts, and other things so that the result is fair, safe, efficient, and beautiful.

And here is an international rationale:

> Geography is about other places. Students (present and future citizens of the world) should learn about the climate and culture of other places, because that knowledge will help them in an interconnected and often highly competitive world.

Are these rationales linked? Definitely -- fair, safe, efficient, and beautiful places tend also to be residentially desirable, culturally tolerant, and globally competitive.

Rationales for learning geography:

it helps us organize our place

and understand other places

A road map for the first part of the book

Welcome to the world of geography, the art/science that deals with **where** things are located, **why** they are located there, and **what difference** their location makes. In the next three chapters, we will describe a spatial perspective, examine two different kinds of maps, and see how geography deals with three strands of meaning at the same time. That will form the background for a look at four key ideas (cornerstones) of geographic analysis (Chapter 4).

The big questions of geography --

where?
why?
so what?

Each chapter has a number of maps or diagrams that illustrate some points in the text. To make these illustrations as worthwhile as we could, we made them as copier-ready transparency masters, so that a teacher could use them immediately in an elementary or secondary classroom. On the back of each master is an outline of a classroom activity that could be based on the Transparency.

These activities are designed to provide examples for a book on teaching geography; they do not add up to a course in geography! We borrowed and adapted ideas from many sources, including the National Geography Standards, curricula such as ARGUS and GIGI, and lesson plans written by some teachers in the workshops and summer institutes we have taught recently. We made no effort to be "consistent" in approach or grade level, because we assume teachers will decide on the grade level and organization (demonstration, class discussion, cooperative group, or individual project), and that they will modify the activities accordingly.

Postscript: an optional note about student activities
(since the space was available!)

In most cases, the Transparencies and activities were designed to stand alone (a given one should not need prerequisites or other materials). Deep inside our souls, however, we do not believe that a geography class should consist of a bunch of stand-alone activities (more about that later). For that reason, we sometimes suggest ways in which the Transparencies can be combined to reinforce each other, perhaps even over a period of many months.

The "engine" of an activity --

the basic thing a student does in the activity

Each of the activities has a fairly simple and straightforward "engine" (the thing that a student does to make the activity run). For example, one activity asks students to find themselves on a map. In another, they discuss the advantages and drawbacks of various sites for a new settlement. A third involves comparing maps in order to identify a possible cause for a disease.

A classroom-activity engine should be interesting, easy to explain, and meaningful.

Engines should be interesting, easy to explain, and meaningful

> An interesting engine makes students want to learn. That is the basis for an old educational proverb: "if you really want to solve a discipline problem in your class, spend 90 percent of your time thinking about class content and only 10 percent about the problem."
>
> An easy-to-explain engine lets them get to the point. Life is too short to spend so much time explaining the rules that there is not enough time left to play the game.
>
> A meaningful engine helps students see that the learning is worthwhile. This is the springboard for the authentic-assessment movement (more about that in Chapter 7).

You might notice that this book does not have any crossword puzzles or find-this-word-in-that-mass-of-letters games. Those activity engines are certainly easy to explain, and some students find them interesting, but do they have a meaningful connection with solving real-world issues or satisfying human desires? Here is the most diplomatic thing I can say about them: They are better than nothing, and they may be better than a dry lecture.

It seems to me, however, that the menu of pedagogical possibilities ought to have more than just three choices: dry lectures, pointless games, or nothing!

1

ONE PERSPECTIVE:
A WAY OF LOOKING AT THE WORLD

The Central Valley of California has the kind of land that provokes envy among farmers in less favored regions. It is awesomely flat, with fertile soil, hot summers, and rivers full of water from the snow-capped mountains nearby. Along a highway in the Valley, a billboard proclaims: "One in four Californians has a farm-related job -- we grow food for the rest of the nation."

A map of farm production seems to support that claim. It shows that total farm production (grains, fruits, vegetables, milk, meat, etc.) is greater in California than in any other state, by a wide margin (Figure 1A).

A map of total food production, however, tells only part of the story.

The possibility of confusion is confounded because the designer of this particular map is graphically illiterate (would you call that condition *iggraphicacy*?) This map maker used conventional map symbols, but inappropriately -- **choropleth** shading is not the accepted way to show total quantities of something.

Choropleth map --
one that colors
each country or state
according to some
measure of importance

In effect, the design of this map is like saying "I hungered is" in English. A perceptive reader can still figure out the correct message, but the choice of words can be confusing.

How do we cut through the confusion? One way is to learn the "words" in the language of maps well. If we can recognize when someone is misusing it (whether out of ignorance or deliberate intent to mislead), we can take the necessary precautions to get the message correctly.

Another way is to map the numbers in context with other information -- in other words, to put information into perspective.

The Census of Population says that California has the largest population of any state. This means that California has more human mouths to feed than any other state. To put the food production of California into perspective, therefore, we might compare food production with population. One way to do this is to calculate food production per person. By that measure, California does not stand out -- its food production per person is actually less than the average for the other 49 states (Figure 1B).

A simple way to illustrate this put-the-data-in-perspective principle in a classroom is by comparing student performance on tests. Suppose Ray had eight right answers on a math test, whereas Kay had 15 correct on her test.

Raw data --

counts or amounts: number of people, tons, dollars, road miles, etc.

Does this kind of **raw data** give you enough information to decide which student did better?

Kay's performance is clearly better, if we assume that both students took the same test. But is that a valid assumption? What else do we need to know in order to find out who actually did better on the test?

For one thing, the tests may have been different in length. If Ray's test had ten questions and Kay's had 30, then Ray's performance seems to have been better: he got 80 percent of his questions correct, whereas Kay had only 50 percent correct.

Cooked data --

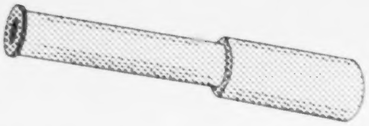
ratios between numbers: percentages, yield per acre, income per capita, miles per hour, etc.

Calculating PERcentages of correct answers (a logical equivalent of farm production PER capita) helps to put the test scores into PERspective. The calculated ratios (should we call them **cooked data**, as opposed to raw data?) can help tell a more complete story. No single number, however, can ever be the whole truth. For example, Kay's test questions may have been more difficult; that makes her lower percentage more understandable.

Likewise, much of California's farm production is in vegetables and other specialty crops, which cannot be grown easily in other parts of the United States. That makes California's crops more valuable, in money terms. At the same time, it makes another gap even wider -- on a calories-per-capita basis, California is a net food importer, rather than a supplier of food to the rest of the country.

Each additional attempt to put raw numbers into perspective helps people understand things better. That is a key goal of liberal education: the ability to put things in perspective.

This "misleading-data-detector," however, is not the only kind of "perspective" we are trying to teach. A liberal education should also foster awareness of (and appreciation for) other perspectives. That use of the term can apply to the perspectives of different cultures (on a global scale) or different population groups or academic disciplines (on a local scale).



A disciplinary perspective

Geography, history, the humanities, and science frequently deal with the same topics, but they look at the world from different **perspectives**:

Academic perspective --
a specific way of asking questions

- Scientists are concerned with *process*. The focus is on causes and effects that occur regardless of time or place. The key questions often begin with "how."
- Historians are concerned with *time*. The focus is on the time of events and what happens before and after them. The key questions often begin with "when."
- Humanists deal with *ethics* and *aesthetics*. The focus is on how to judge things like morality and beauty. Key questions often begin with "should" or "how important."
- Geographers are concerned with *space*. The focus is on the locations of things, the forces that operate in a given place, and the **spatial** relationships among places. The key questions usually begin with "where."

Spatial --
refers to distances, directions, areas, and other aspects of space

A geographer may borrow knowledge from other disciplines, but the focus is always on the locations of things and the connections among locations. We do not claim that this is the only path to truth, or even the best path. It is just one part of the truth. In some cases, however, it is an essential part -- one cannot get a valid picture without a geographic perspective.

The value of a geographic perspective rests on three simple ideas:

There are reasons for things being where they are.

There are advantages for things being in particular places.

There are penalties for things being in the wrong places (see Figures 1C to 1H).

After looking at these examples and many others like them, here is my favorite potluck-dinner-or-other-social-occasion rationale for geography (in 25 words or less): *geography is the discipline that helps us understand why something we know here, in this location, may be wrong in some other location.*

That is a simple-sounding sentence, but it can be applied to a wide variety of subjects, ranging from table manners and courtship rituals to the design of freeways and the administration of public health policies. A skillful geographer (just like a good historian or scientist) has to draw on a wide range of knowledge and skills.

Some of that necessary background is factual: to understand why something may fail in one place even though it works in another, we must know something about the places. Factual knowledge, however, is not always enough; we also have to understand the ways in which people organize facts and ideas.

Deductive versus inductive approaches

Inductive and deductive modes of teaching

We could keep on talking about the geographic perspective in this verbal, abstract, **deductive** mode. I submit, however, that much of geography is easier to teach **inductively**, by amassing observations and then drawing conclusions. This "back-door" approach is also a very useful perspective for teachers, because it helps bridge an age-and-experience gap between teacher and student.

That gap is part of the reason why deductive teaching does not always work well. A deductive outline or generalization might sound fine to a teacher, who has a bunch of experiences and images that the generalization ties together. The fit with those experiences are precisely what makes the generalization seem so compelling, so "right." Young students have fewer experiences, and the ones they have are often individual rather than shared. For that reason, they sometimes "just don't get" an idea that a teacher might think is almost self-evident. Geography teachers, therefore, have to make a conscious effort to build a "vocabulary" of shared images as well as an explanatory worldview.

Having made that assertion, I suspect that it is probably wise just to end this first chapter and proceed to the rest of the book. We will have more to say about images, explanations, and perspectives later. Those observations, however, will come after we assemble some shared experiences with the transparency masters and other concrete examples that illustrate this book. The delay is for a sound pedagogical reason: in the long run an inductive approach is better for most geography, including books about teaching geography!

The next four pages have a short muse about the importance of the little word "where," followed by an editorial postscript about the American perspective on geography. You could postpone reading either. The purpose of the muse is to give a teacher a few more examples of why public understanding of geography is important for a fair and efficient society. The postscript is for reading if (or whenever) you wonder why schools in the United States seem to lag so far behind their counterparts in other countries in trying to foster that kind of public understanding of geography.

A muse about the little word "where"

Where. Such a simple-sounding word, but it can mean so much.

We make decisions about **where** to put or do things every day. Those decisions usually have consequences, which often can be predicted by using the tools of geographical analysis.

Think about **where** the bathroom is. If it is in the middle of the hall, people from the kitchen and the bedroom can get to it equally well. If, however, it is at the end of the hall, beyond the bedroom, it will take four seconds longer to get there from the living room and kitchen (**where** most people start more trips to the bathroom).

Four seconds, each way, say eight times a day, 365 days a year. That is seven hours, which could be used for something else.

Big deal, you say? Seven hours for each family in a city of a million would be enough to build nearly 200 houses. It would repair more than a thousand miles of road. It would provide day-care for two thousand children. That is the price a city would pay if it put all bathrooms just four seconds farther from **where** the people are.

On the other hand, I am typing this on the fifth floor of an office building. There is a lavatory on our floor, but I often walk up to the one on the tenth or twelfth floor -- people who write for a living sometimes need a little exercise as a break from typing! The importance of **where**, therefore, depends on your perspective.

Consider the task of trying to build a new freeway through an old city, **where** property lines were arranged to fit life before the automobile. The Census shows one result: I paged to the "L's" in my *American Almanac* to compare Lowell, Massachusetts (an old city, by American standards), with Lincoln, Nebraska (a young city of about the same size). A typical worker in Lowell spends 12 minutes more each day commuting to work. Over a year, the hours "wasted" in this medium-sized city are roughly equal to the total number of worker-hours in a company such as Microsoft, Rubbermaid, or Southwest Airlines (employment data from *Hoover's Handbook of American Business*). All that extra cost, just because of **where** roads and property lines are located.

The costs or benefits of "where-knowledge" are not just financial.

- For example, imagine what it is like to get bitten by a strange dog in a city **where** you cannot speak the language.
- Now imagine that you are choosing a trail and packing your knapsack; would it be useful to know the elevation **where** the blueberries are ripe this week?
- Finally, picture walking through a neighborhood with boarded-up windows, and graffiti on the walls, and you do not know **where** to find an open store or telephone.

We could easily give many more examples of the value of **where**-knowledge in making decisions at the scale of an individual. As with the examples of the bathrooms and freeways, the value of such knowledge is proportionally greater (although often harder to measure) at the scale of a community or society.

Here is a poignant example. On a crisp November day, a child in northeast Detroit was jostling with other children and fell into a street, **where** she was seriously injured by a passing car. This accident happened **where** it did partly because a hundred thousand commuters use half a dozen city streets to get from **where** they live to **where** they work. Over a year, dozens of schoolchildren will be injured on these particular streets. The geographic principle is easy to state: the riskiness of a school crossing is related to **where** it is with respect to homes, jobs, and traffic patterns. The consequences, however, can be magnified if politics in an urban area are guided by the benighted notion that people who live beyond a city-suburb boundary should not have to pay taxes to help solve "the problems of the city." In other words, people's perceptions of **where** problems occur can sometimes keep them from taking moral and financial responsibility for problems that they may be physically responsible for causing.

The fact is, every action on the planet has causes and consequences that depend in part on **where** the action takes place. The proper response for an individual or a society depends on **where** the consequences occur and who gets hurt or helped by them.

For example, suppose a Wisconsin shoe company opened a dozen stores in Florida and shipped each one a truckload of insulated boots to sell for Christmas. This action would suggest some ignorance of the climatic differences between Milwaukee and Miami. If the company goes bankrupt because the shoes do not sell, the penalty for ignorance falls directly on the ignorant people.

It is harder to decide whether government has a right to deny a permit to someone who wants to rebuild a beach house that was damaged by a hurricane. The benefits of a beachfront location accrue to a few individuals, but the costs may be borne by everyone who pays insurance premiums or taxes (unless the tax and insurance policies are designed with precisely the kind of geographic understanding we are advocating).

In short, it is easy to find egregious examples of things that make sense in one place but are laughably inappropriate in another. The benefits of geographic awareness, however, can be subtle: safety, fairness, efficiency, and beauty often depend on arranging things in a slightly better way -- bathrooms a bit closer, shopping malls in better locations, houses on safer sites, tax money transferred between municipalities to help pay for services, and so on. As with any subject, geographic understanding is a matter of degree.

In other words, "where" is a word with many gradations.

Postscript: a (we hope) soon-to-be-unnecessary note about levels and standards

Much of this book is based on discussions at more than 40 teacher workshops in 14 states. Many of those teachers commented that the material being presented was different from what they were used to. They usually called it interesting, but they sometimes expressed doubt that it would work for their classes. These comments usually came early in the workshop, *and in nearly every case, after working with the material, the individual later admitted that the doubts were not valid.*

This leaves me with a huge dilemma: an author needs credibility, and yet my experience as a workshop leader tells me that many teachers have first impressions that tend to undermine credibility. To get over this hurdle, it might be useful to try to figure out why American teachers often express doubts about teaching this kind of geography.

Even here, a geographic perspective is useful. When we use some straightforward statistical measures to compare the United States with other countries, we are struck by three facts that seem to be "causes" and one fact that seems to be a "consequence:"

Cause-fact number 1: the United States has been relatively isolated. It occupies a large fraction of its continent, and its economy is seven times as large as the economies of Canada and Mexico put together. Until airplanes and telephones helped "shrink" the globe, Americans simply did not have to worry much about powerful neighbors with different languages and ideals.

Cause-fact number 2: the United States has been relatively rich. It occupies the most favorable part of its continent, and it has much more good land per person than other large industrial economies (Figures 1I and 1J).

Cause-fact number 3: the United States has been relatively powerful. As recently as the 1960s, the U. S. exported more than it imported, loaned more than it borrowed, owned more in other countries than they owned here, and held most of the patents on its industrial processes.

Consequence-fact: typical United States high-school students receive less than one-sixth as much geography instruction as their counterparts in other countries.

So what should we reasonably expect? American high-school students perform at levels far below the international average. And many American teachers do not know what is attainable or desirable in an elementary or high-school geography class. That is not their fault -- they have little experience with world-class geography. I repeat: it is not our fault, but if we want to break the cycle of sub-standard geography, we may have to ignore first impressions about what is possible or desirable.

An extension of the comparative analysis suggests that we do have a compelling reason to break that cycle, because the world is changing. The blunt fact is that all three of the cause-facts in the list above are less true now than they were in the past. For example, ideas about land ownership that were acceptable for a country of fifty million people may not be appropriate as the population approaches 300 million. As parts of the country become crowded, Americans need to think more about how they organize and use their land.

At the same time, connections among nations are becoming both more complex and more important. A century ago, there were few links between Tennessee and Tokyo. Now, a Nissan factory near Nashville practically guarantees that events in Tokyo will affect people in Tennessee nearly every day, in many ways.

A world-class level of geography education is not that far *above* what we do now -- it is just *different*. Our students need to learn how to analyze things spatially, not just try to memorize facts about places. They should observe, hypothesize, and evaluate, not just color maps and find names of cities in huge arrays of letters. In short, they need to do world-class geography. (This is a citizenship issue -- resource-rich America has achieved a high standard of living; but inefficiencies and inequities in the way we allocate and use resources now seem to be hindering our efforts to maintain that position.)

So, try to ignore doubts, at least for awhile. Read the next chapters, which are about two analytical blades, three strands of meaning, and four cornerstones of geography, and think about how you might adapt these ideas for your students. It will work -- hundreds of teachers have told us so. This kind of geography is not the same as reading "all the facts about Albania" in an almanac or atlas, but students actually *know* more about the world when they finish.

Moreover, they are not unaware of the potential value of a geographic perspective. They usually think that this kind of geography is at least as much fun as watching another video about weird-looking animals or colorful costumes in exotic places. At the same time, the proposed kind of geographic instruction engenders a more durable kind of learning.

(We warned you this was an editorial! It is offered in the belief that readers have a right to see where editors stand on some issues that might influence the editing of a book or newspaper.)

2

TWO BLADES OF A SCISSORS: A COOPERATIVE "SPLIT" WITHIN GEOGRAPHY

A cutting block is a useful tool. It has a big advantage: a firm surface under the material can make cutting more efficient. It also has a big drawback: cutting against a block can dull a knife. This kind of dilemma is not unusual when dealing with tools and other resources. Indeed, it is both common and deeply ironic: precisely what makes a thing or place useful can also pose a problem, especially if used too much.

Viewed in the context of a knife and cutting block, a pair of scissors is an ingenious invention. For some kinds of cutting, scissors have the advantage of a cutting block without the drawback. By aligning two blades so that they cut toward but not directly into each other, it is possible to provide support for the material and still keep the blades sharp.

A scholarly discipline is basically a way of cutting into (analyzing) the world in order to see how it works and how it might be made better. The efficiency of that cutting depends on the sharpness of the analytical blades and how well they can be manipulated.

Geographers have a scissors-like method of analysis that works very well when used properly. Each half of the scissors has a unique scale, focus, type of map, and mode of investigation (see Figures 2A and 2B):

> **Regional geography** is the study of *interaction* at a local scale. This blade of the geographical scissors looks at a multitude of traits of a particular place -- its climate, economic connections, political structures, ownership patterns, religious beliefs, historical events, etc. The specific focus is on how various features interact in a place to make that place what it is.

Regional geography --
Study of how
a variety of things
interact at a local scale
(Various authors link this
approach with the words
synthesis, idiographic,
ecological, biography)

Someone using the regional approach might look at Bosnia, for example, to see how its combination of ethnicity, forest cover, building types, road networks, and hilly terrain interact to permit a guerrilla strategy that is hard to counter with conventional military force.

Reference map --
shows the locations of a variety of things in a specific area

The primary tool for the regional blade of the geographical scissors is a **reference map**. This kind of map uses a number of different symbols to show the locations of a variety of things in a specific area. Armed with a good reference map, geographers can ask what is located here, what forces converge to shape this place, how people define, mark, and use the land here (Figure 2C or 2E).

Topical geography --
Study of spatial patterns at a broad scale
(Various authors link this approach with the words analysis, nomothetic, systematic, culture)

Topical geography is the other blade of the geographical scissors. It is the study of *spatial pattern* at a broad scale. The focus is on the arrangement of a single feature in a fairly large area -- where it is abundant, important, clustered, scattered, scarce, or absent.

Someone using the topical approach might look at a map of followers of Islam, for example, and notice how the believers in this religion are concentrated in a band across northern Africa and southwestern Asia, with extensions into southeast Asia, Europe, Indonesia, and several other parts of the world. (The extension into southeastern Europe is of obvious significance for someone looking at Bosnia; this linking of global pattern with local interaction is the scissors effect.)

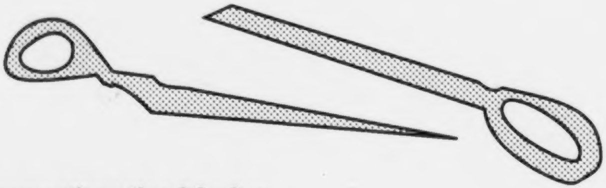
Thematic map --
shows the arrangement of a specific thing in a large area

The main tool of topical geography is a **thematic map**, which shows where a specific thing occurs within a large area. Armed with that kind of map, geographers ask why that feature occurs there, what else those places have in common, and how things spread from where they started to where they are now (Figures 2D or 2F).

Geography achieves its unique analytical power by using both the topical approach and the regional approach at the same time. For example, you might notice a feature in a specific place and wonder why it is there. Look around for plausible causes, identify a likely one, and then shift to the topical mode and make a thematic map of it. Trace the cause back to where it begins, assess its strength, note where else it occurs, and then shift back to the regional mode and look at the interplay between the possible cause and other features in those places (as on Figures 4M or 4V).

The process can also start with the other blade. Say you come across an intriguing thematic map (such as Figure 8C). Try to find some other things that have similar map patterns. Then shift to the regional mode to see how those factors interact with each other in a local area (as on Figure 8D).

In short, regional and topical geography are like the two blades of a scissors. If they are separated, they can still cut, but the blades are far more effective when used together. (Keep this analogy in mind as you read the other chapters of this book; they have many examples of the scissors principle in action.)



Separating the blades

The blades of the geographical scissors work best when used together. Unfortunately, many curricula and textbooks are organized in such a way as to blunt the major tools of geography. In effect, many geography classes and textbooks are more like cutting boards than scissors; they work for awhile and then get dull.

Artificial divisions within geography

This happens when books or courses put geography into artificial categories and then deal with them separately. For example, universities typically offer a group of topical courses, with titles such as physical geography, landform geography, economic geography, or urban geography. In another category are some courses on the geography of various regions such as Australia, Africa, or North America. Along with these topical and regional courses, the curriculum also includes technical courses such as cartography (map making) and quantitative methods.

This kind of specialization can work well at a research university, where students take several courses and then enroll in seminars that tie the various parts together and show how they apply to specific problems.

Unfortunately, many university teachers use the same categories even at the introductory level. They get in the habit of working primarily within one side of the discipline. The other blade is usually in the back of their minds, where it stays sharp and ready to use in their research and advanced courses. Their students, however, do not have that background, and therefore they often cannot see the link between the approaches.

Doubly unfortunately, the topical-regional split tends to "trickle down" into textbooks written for elementary and secondary school. This is especially true for texts (there are a lot of them) that are written or edited by social-studies teachers, English majors, and other people who have had only a few geography classes. They may not have any experience using the scissors approach, and as a result they actually think that it is a desirable goal to keep the blades separate.

Triply unfortunately, publishers sometimes try to make this weakness into a strength. They advertise that their textbooks "establish a general background with chapters on climate, landforms, agriculture, industry, and urbanization, and then go on to analyze various regions of the country."

That works, but not very well: it is like taking the scissors apart before trying to cut. The general topical chapters do not seem relevant to students, who therefore fail to master the material. Then, when they get to the regional chapters, they lack the background that presumably was "covered" in earlier chapters.

Global forces, local interactions

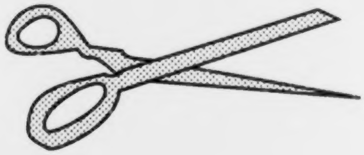
In short, a topical-and-then-regional organization loses one of the most ingenious parts of the geographic perspective, namely its awareness that *the world consists of forces that operate on a global scale and interact on a local scale with a unique mix of other forces to create the specific features we see in particular places.*

(As the old adage says: think globally, act locally; that is the only way to achieve global change!)

To summarize the problem caused by separating the scissors, note that geography loses part of its "soul" when it uses only one blade:

Without the local-interaction half of the scissors, geography becomes like a science, looking at a single factor in isolation in order to see how it works. This is valuable information, but a geography class that does only this is vulnerable to the criticism that other disciplines such as geology or economics do it better.

Without the global-topical half of the scissors, geography becomes like a catalog of features in a local area. This information is also valuable, but taken to extremes this kind of study can become a rather trivial pursuit (pun deliberately and subversively intended!)



Keeping the geographical scissors together

For geography teachers, the challenge is to figure out ways to keep the blades together, so that the scissors can cut efficiently. This is basically a technical problem in applied communication theory, and therefore it can be very useful to look at examples of well-designed advertisements, books, magazines, television shows, and other successful forms of communication.

Textbook authors sometimes solve the problem of a scissors approach by using some **layout devices** such as boxes or tinted pages. A regional book, for example, might have chapters with titles such as "Australia," New England," "The Equatorial Region," or "Yakut Homelands." The primary emphasis of a chapter is on the specific place noted in the title. To provide the other blade of the analytical scissors, the text has "analytical boxes" or "theory pages" that treat topics such as the Demographic Transition or Central Place Theory (e.g., Figures 2G and 2H).

Layout devices -- mechanical "tricks" such as outline boxes, unique type faces, or tinted pages, which an author uses to help readers stay oriented

A textbook with a topical organization, by contrast, might have chapters with titles such as "Population Geography," "Economic Patterns," or "Environmental Problems." The primary emphasis of each chapter is on broad principles that apply anywhere. To provide the other half of the analytical scissors, the authors might make a set of extended figure captions or case studies. These offer local illustrations of the general principles that are discussed in the surrounding text. Outline boxes or colored pages can isolate these elements so that they do not necessarily interrupt the flow of logic in the chapter itself.

This kind of organization, of course, requires careful planning to make sure that important topics and regions are "covered." A synopsis of such planning often takes the form of a **matrix**, with topics on one axis and regions or local case studies on the other. Symbols in this matrix show which topics are emphasized in the context of which regions (or which local case studies help illustrate each topic -- see Figures 2I and 2J).

Matrix -- a row-and-column table; this example has columns of topics and rows of regions

Here is a summary statement that might be seen as heresy in some quarters: *it really does not matter whether the primary organization of a book or a class is topical or regional.* In fact, a teacher may choose to change which blade of the scissors is "up" from day to day. Some students may become disconcerted if the class does not "follow" the book every day. Anticipate that consternation, and try to deal with it, but do not compromise on the basic principle: the benefits of scissors-like geography (if done well) far outweigh the occasional frustration.

Using both blades of the analytical scissors requires only two things: the will to do it, and a few mechanical "tricks" to remind students of what kind of geography is happening at the moment. For example, a teacher can "zone" parts of a classroom to facilitate the creative tension between the regional and topical blades of the geographical scissors. Here are seven well-tested strategies:

Seven ways to organize a room to "be a scissors:"

1) Use a topical outline for class activities and assign readings that have a regional perspective, or vice versa. For example, a teacher might lead a discussion on recent changes in the locations of various kinds of retail services, such as outlet malls, gas stations, or drug stores. During this discussion, ask students to react by

Let readings be the other blade

explaining how the general theory of retail trade fits with their readings on the building of a new mall or the attempt to revitalize an old downtown. (The practical implications of those topics might also be noted for parents or school board members. Most adults have lived through several revolutions in the geography of retail trade and have memories of both the excitement of a store-opening and the dislocations that a store-closing can cause for sellers and buyers alike).

Have a specific place for the other blade

2) Walk to a specific place in the room when you step out of the "primary" role for the day. For example, in a class on the regional geography of Japan, a teacher could walk over to the "topical desk" in order to project a world map and to outline the theory of international capital movement. (Yes, that kind of topic should be introduced in middle school. A teacher does not have to use a jargon term like "international capital flow" to help students become aware that Japanese investment is crucial to the economies of places as far apart (and as different) as Thailand, Toronto, and Middle Tennessee (where Nissan trucks are made)).

Use a prop to identify the other blade

3) Pick up a prop such as a book or flag (or put on a distinctive hat) when you step out of the "primary" role for the day. For example, a day that is organized as a topical discussion of natural hazards might include an occasional comment from "a resident of London," "a representative from the Tamil group," or "a voter in western Mississippi." This individual could provide insights into how the general idea for the day fits into the geography of a local area. (You might even try to use a regional accent and some colloquialisms, if you can do it tastefully; or bring a short audio or video tape to class.)

Use different media for each blade

4) Use different media to present different perspectives. In my university classroom, the slide projector's job is to provide images and other features about specific places (i.e., regional geography). The overhead projector's role is to show thematic maps and outline analytical theories (i.e., topical geography). Students realize that they should look for place-facts in the material presented with slides. They know that this kind of information will be tested with multiple-choice and matching questions (see chapter 7). Material presented with the overhead, by contrast, is usually topical (theoretical) in nature. It applies to many places, and student mastery will be evaluated with short essay questions or in term projects. In short, the simple act of turning off the overhead and pointing at a slide can save me the trouble of verbally telling students what kind of information

they are about to receive. Other media that lend themselves to being "typecast" in this way include the chalkboard, films, videotapes, guest speakers, or computer simulations. (Tables 3-1 and 3-2 have more tips on the design and use of color slides and overhead transparencies.)

Assign roles to bring out the other blade

5) Assign roles to various students. One natural way to involve students in dialogue is to have individuals or groups do background research on specific places or topics. For example, while a teacher is making a topical presentation on world patterns of land use, the student(s) who did the research can be called on to provide the counter-perspective from a specific country such as Japan. Similarly, as a teacher talks about the regional geography of the Tokyo area, a student could report on some background reading about the kind of terrain and soil needed for rice production (see Figures 2K and 2L).

(It is only a short step to eliminate the teacher's presentation role entirely and have students do both halves of the analysis. For example, one group can make a world map from United Nations data, while another group does research on a specific country or region. Bring the groups together, and give each the same instructions: prepare some clear illustrations of yuour point, present your findings to the class, and then write a short paragraph outlining how the material presented by the other group adds to your understanding of your own subject.

Use field trips or homework for the other blade

6) Use field trips or homework to complement in-class activity. Present something in class (by any method, from lecture to individual or group activity), and then assign homework that uses the other perspective. For example, you might make a class presentation about how land value decreases as you go away from the center of a city. Then have students gather information as they travel to or from school or shopping areas. Ask them to focus on the size and spacing of buildings as an indication of the value of the land.

(One intriguing student project is to note how much it costs to park a car in different parking lots around a city. This idea came from a fifth-grader who did a geography-fair project on the prices people charged to park cars in their yards during the Minnesota State Fair. As you might predict, the fees declined from about ten dollars per day right across the street to a mere two dollars a day seven blocks away. Beyond that, it apparently was not worthwhile for people to stay close to their houses in the hope that someone would want to park in their yards. The student who did this project now has a powerful first-hand appreciation for what she might later learn is the Von Thunen model of location rent, a famous geographic theory. For some more tips on how to prepare homework assignments in geography, see Table 2-1)

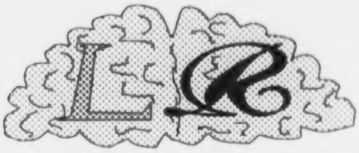
Announce that a test will be used as the other blade

7) Use a test as the other blade. Present something in class from a topical perspective, and then hand students a map and tell them that the test will consist of one question: how does this theory apply in one of the ten places shown on this map? For example, a teacher might talk about birth rates and death rates in class and then ask about population change in specific countries on the test. Give them a few days to do some research, think about the answer, discuss with their small groups, and/or ask questions in class. Reward the students whose questions reflect an understanding of the scissors in action. Alternatively, provide several regional descriptions in class. To vary the mode of presentation, you might include short dramatic skits or poetry readings as well as the more typical films or illustrated lectures. Warn students before beginning that they will be asked on test day to draw a thematic map to summarize the in-class presentations for the week. For example, one might read from diaries about the weather along several hiking trails and then ask students to draw a map to show the "geography of temperature" in that month. If carefully done, this activity can underscore a number of principles about the change in temperature with latitude, altitude, and time of day.

This book exemplifies the scissors in action

You may have noticed that this book is doing something much like option 4 (using different media for each blade of the scissors). The text itself is mostly general and theoretical, whereas the sample transparency masters are specific, practical illustrations of the theoretical principles. We reverse the roles in a few cases, deliberately, in order to make a point better.

The interplay between topical and regional perspectives is what stimulates thought. For that reason, we want to underscore that you need not use the examples and overhead masters provided in this book. The sample transparency masters have done their job if they inspire you to create similar examples to use in the classroom. Feel free to substitute another city roadmap for Figure 3H, another mall for Figure 4C, or another hill on Figure 6F. You could also use temperature or growing season on another continent instead of rainfall in Africa on Figure 4U. (In fact, if you think of a better example for any point in this book, sketch it on a piece of paper and send it to the authors. We can always use new ideas for the next edition!)



A Contribution from Cognitive Psychology

One final note: cognitive psychologists have a number of plausible theories about why a scissors-like interplay of local case studies and general principles seems to work better than staying within either the regional or topical mode. Current research suggests that learning is more efficient if multiple brain pathways are engaged.

Here is a gross oversimplification of a complex process. The linear, analytical, left **hemisphere** of the brain is most involved with theories and mathematical relationships. The intuitive right hemisphere of the brain gets into the act when the topics are spatial relationships and local interactions of phenomena. Despite its simplistic tone, this idea has more than a germ of truth in it. Spatial reasoning (the kind of thing that geographers do) does seem to involve cooperation between both halves of the brain. To be efficient, therefore, geography teaching should seek to promote involvement of many parts of the brain.

Brain hemisphere -- "half" of the brain; various places in the brain seem to work at different intensities when people do different tasks

"Efficiency," of course, is a loaded word in pedagogical circles. It is true that a teacher can probably get students to regurgitate more facts about places through rote memorization and drill. Assertion of that "truth" should bring up two questions, one general and one specific.

- The general question is whether that kind of learning has any lasting impact.
- The specific question is whether rote memorization equips people with the kind of geographical awareness that they need in order to read daily newspapers, guide political choices, and make personal decisions about where to live, work, shop, and travel for the rest of their lives.

The answer to both questions is, "probably not." That is precisely why we advocate a scissors approach to teaching geography, even though it may take more time and effort to set up properly.

Table 2-1: Some design principles for take-home worksheets and projects

1) Homework should have a point, an obvious relevance to goals that are already accepted or are clearly explained within the written handout. Some students dislike all homework; a teacher cannot do much about that. Many more students, however, resent homework that is ambiguously explained or (worse) is clearly busywork. That resentment, in turn, will often transfer to the rest of the class.

2) The first few steps of homework should be relatively easy and self-starting -- perhaps a review question, a paraphrase of a section of reading, a straightforward mathematical calculation, or an observation that does not require fine distinctions. A substantial fraction of students are likely to get frustrated if the first step requires complex action or abstract thought, especially if it carries the possibility of being completely "off base." By contrast, a concrete first step with a product that can be tested immediately for its correctness will usually instill a sense of progress and a willingness to tackle more complex tasks.

3) The core of a project should feature an interplay of regional and topical information. That multiple emphasis requires careful thought to ensure that the various projects in a course fit together to "cover" the facts, theories, and skills that are to be emphasized in the course (perhaps by using a matrix or two, such as Figure 2J)

4) The project should have clear statements of the amount of time that is reasonable to devote to each step. Few things are more frustrating for a student than misreading the scope of a project and doing much more or less than was expected. Describing the expectations in terms of the task to be done, the likely time requirements, and the product can help reduce anxiety by providing several mutually reinforcing statements about the scope of a project or other take-home assignment.

5) The product should usually be uniform and easy to evaluate. For example, a standard checklist, graph form, or answer sheet can make the task of evaluation much easier. Even in cases where the product to be evaluated is a free-form essay or diagram, a clear set of instructions about the form of that essay or diagram can make the product easier to evaluate for the teacher and less stressful for the student. Having a variety of forms to fill out for a geography class can also help instill good work habits and a decreased fear of the forms that are a part of modern society.

6) A mechanism for repair and/or improvement after evaluation can help transform the body-language of a project from a simple transaction, in which a student gives something to the teacher in exchange for a grade, into a more complex relationship in which the student is assembling items for a portfolio that will serve multiple purposes.

7) Some clear suggestions about ways in which a student may wish to expand or elaborate on a project are also useful, especially in a portfolio-based evaluation system. Acknowledgement of extraordinary effort is often a starting point for an informed career decision, to the extent that a student learns that the enjoyment felt in doing something worthwhile can be a clue to be noted and used in making choices about courses, educational options, and eventually careers.

3

THREE STRANDS OF MEANING: COGNITIVE PSYCHOLOGY AND GEOGRAPHY

Geography is less like a science than like a foreign language.

That sentence was part of the rationale to get a geography course listed in the communications group of a college curriculum. Like many successful ways of coping with "new" curricula, the sentence is a blend of disciplinary belief and campus politics.

The disciplinary belief is that geography is a multi-stranded subject. Learning geography, like studying a foreign language, involves using several cognitive abilities at the same time.

How do people learn a language?

Effective teaching of any subject must start with an understanding of how people learn. Teachers in a French class, for example, do not ask students to spend the first week memorizing all the words that begin with the letter A. Not only would that be numbingly boring, but experience shows that rote memorization does not work well.

Likewise, people seldom try to teach a foreign language by concentrating on nouns for a month and then moving on to pronouns, adjectives, and verbs in the next three months.

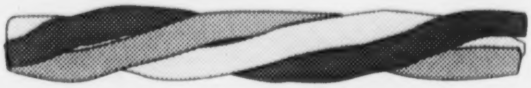
By learning mechanical details and abstract ideas at the same time

No, language teachers try to get students involved with meaningful situations and interesting stories. In this way, learners see that mechanical details such as case endings and word placement are important in order to make sense out of a story. The story provides the justification for learning grammatical details, and the details provide the building blocks needed to convey the nuances of the story. The course continues with a carefully calibrated blend of abstract idea, concrete detail, grammatical rule, and semantic idiom, like separate strands woven together into a strong rope.

Language teachers nowadays may not even have students learn the entire alphabet before reading some simple sentences or learning some useful spoken phrases. They realize that allowing students to do conscious (or even unconscious) linking of cognitive strands is one of the most powerful ways to promote learning, because the human brain is structured to acquire knowledge in precisely that way -- through several pathways simultaneously.

Why, then, do so many geography textbook authors think that teachers should try to provide a "global frame of reference" and "necessary map skills" before "going on to study the traits of various regions?"

That just does not work well!



A three-strand model of geographic education

Teachers in many fields, from archaeology and Bible studies to poetry and zoology, endorse a conceptually similar multi-stranded model of what they do. One strand has concrete "facts" (i.e., the artifact, the text, the couplet, the animal). Another strand has explanatory theories. A third strand consists of opinions and value judgments.

Hermeneutics -- the science of abstracting meaning from a text

(Many of these **hermeneutic** models of inquiry use the terms "level," "mode," or "plane" to express the core idea of this chapter. We chose "strand" for reasons we'll explain later.)

A three-strand model of cognition is hardly a novel idea, but it is a good way for teachers (at all grade levels!) to view geography. Looking at geography in that way reminds us that we must try to foster three distinct kinds of "learning" more-or-less simultaneously:

Images -- the words and sensory impressions that are associated with particular places. These are like the "letters" and "words" of the language of geography. You have to know them in order to make sentences.

Analyses -- the theories that geographers have devised to help them interpret or explain the features they see in different places. These are like "sentences" and "paragraphs" in geography-language.

Evaluations -- that value judgments and other opinions that people form about places. These are like the "semantic overtones" and "metaphors" that help communicate some of the most important ideas.

This chapter will explore some implications of this three-strand model of geographic knowledge. Because of the linear nature of a printed book, we devote a separate section to each strand in turn, but there will be plenty of intentional overlap. This is because we refuse to allow the details of book organization to deny the main point of the chapter: *geography is a multi-stranded subject, and learning is most efficient when it takes place in several cognitive domains at the same time.*

Images and Words -- One Thread of the First Strand

One major strand of geographic education deals with building word-image-place vocabulary. As part of their attempt to understand a place, people need to observe and name the features there. This is an essential part of trying to find out why the features are there (and why their presence in that location may be good or bad, desirable or undesirable).

This process of feature-naming, however, is emphatically not a one-way street. A learner has to have some kind of theoretical model of a place, some prior notion of how it works, in order to make valid observations about the features there. In effect, you have to know a little bit about something before you can efficiently learn more.

The Grand Canyon provides a good illustration of this seemingly circular process in action. A professional geologist will almost always "see" more in the Canyon than a novice. The geologist's mind already contains a large stock of words about rocks and land-forming processes. Standing on the Rim, the geologist can make use of these words about erosion, resistance, oxidation, perhaps even Redwall limestone and Vishnu schist, and so forth. This process of naming and relating sub-features of a complex scene takes time. That is why the geologist probably will still be there long after the novice has "seen it all" and left (Figure 3A).

(Caveat: one should underscore the word "probably" in the previous sentence, because an exceptionally creative individual can make up terms and ideas while the eyes and mind play over the scene. That apparent exception to the rule only reinforces the major point: an interplay of

> concrete images, theoretical ideas, and value judgments is the best pathway to learning.)

The image/word strand -- learning words to represent the features in a place

One important part of geographic education, therefore, is the process of learning words for the unique features that occur in other places. From the lush Amazon rainforest to the prefabricated concrete slums of suburban Moscow, various places on earth have distinctive landscape features that clearly say (with apologies to the author of the Wizard of Oz), "you're not in Kansas any more." It follows that a Kansas geography teacher must find some way of bringing those images and associated feelings into the classroom, so that Kansas students can learn about other places.

Over the years, people have tried many different ways to accomplish this process of image-building. Verbal descriptions, textbook photographs, enlarged prints, color slides, films, video clips, and now CD-ROM all work as image-presenters. Student activities that accomplish the same end include making photo essays, montages, videotapes, or place profiles, writing poems and diaries, exploring data banks, and exchanging information with other schools (Figure 3B).

Of all these image-building technologies, 35mm cameras and slide projectors are at present the most flexible and cost-effective for geography teaching. Color slides or photos are also the basis for images in textbooks, CD-ROM disks, and photo-essays. Video tape is beginning to make inroads as an alternative to slides, but cost and flexibility still seem to favor slides (at least for the first edition of this book!)

Skill at taking slides (or videos) for classroom use is therefore a desirable goal (if only to enable geography teachers to recognize good images wherever they may be found). One might start by appreciating the fundamental difference between *art* and *design*.

The distinction between art and design

> An artistic photograph demands (and deserves) extended scrutiny to discern its many layers of messages. A well-designed photograph, by contrast, tries to bring an image of the world into the classroom efficiently. That does not mean that a classroom photo cannot be beautiful, even striking, but first and foremost it must be transparently intelligible. I suspect that many [educational] photographers resort to arty tricks to cover their design weaknesses.
>
> (*Journal of Geography* 1985, page 16)

Failure to distinguish between art and design is partly responsible for the plethora of "multi-media" materials that offer a smattering of exciting images, MTV style, but do not work together to create a durable whole out of their collections of parts. You want evidence? Look at all the television specials and picture books (you know, the ones with names like "Journey Down the Nile" or "Paris, a Photographic Tribute"). These have flooded the market at precisely the same time as American student understanding of geography has demonstrably declined.

In short, mere collections of beautiful films or gorgeous photographs do not accomplish the goal of geographic image-building. Students may enjoy looking, but these books all by themselves don't seem to teach much that endures.

So what kind of photographs (and, by implication, films and video clips) should a teacher look for? Ones that bring important images of the real world into the classroom efficiently and unambiguously. In that way, students can learn the words while weaving them together with the ideas and value judgments that are also part of the lesson. Table 3-1 has some basic design principles for making slides for geography classes.

Words and Images -- Another Thread of the First Strand

Familiar words can have different meanings in different places

There is another thread in the image-word strand: a word can have different meanings in different places. The houses that Native American people used at the time of Columbus provide a useful example of this "reverse" process of associating images and words. Depending on its location, the word "house" might have meant a snow cave, log hut, bison-skin wigwam, stone cliff dwelling, or bark lodge (Figures 3C and 3D).

In a class or take-home activity, students can try to match photos or drawings of houses with descriptions of various environmental conditions. This simple matching activity works at nearly any grade level from primary to college, but it can start a good discussion of explanatory theories and value judgments.

> "What specific features can you see (in this picture) that make this kind of house appropriate in this kind of environment?"
>
> "How might someone who lives in this kind of house try to deal with an invader from Europe?"

The answers to these questions were different in different parts of North America. That fact is an important aspect of the historical geography of the continent. Later in the term, just a brief mention of this house-type discussion can help encourage students to apply the different-images-for-the-same-word principle to other words, such as "factory," "ghetto," or "store."

In this way, students begin to appreciate that the very process of seeing and naming features is strongly influenced by their personal history: the families, schools, and other aspects of the culture in which they were raised. (Why else would Saddam Hussein put so many patriotic slogans and pictures of himself on billboards all over Baghdad? He'd like the citizens to associate the word "leader" with his face!)

A given culture, in turn, is influenced by the environment around it. Awareness of the complex mutual interaction of culture and environment is an important learner outcome in geography, if for no other reason that because it helps keep students from accepting simplistic ideas of cause and effect.

This is basically a restatement of the main point of this chapter: image-building is hard to do successfully if it stays firmly planted within one cognitive domain. That, in a nutshell, is the fatal weakness of so many commercial films, videotapes, slides, CD-ROMs, or data sets. They claim to have "all the information you ever wanted to know about a place," but they provide knowledge only within one cognitive strand. If students are given the task of memorizing a lengthy list of numbers and names, one should not be surprised if they don't learn very much. Facts, in and of themselves, begin to look like other facts and eventually get confused with them, unless they are woven together with ideas in the other cognitive strands.

Before we go on to talk about the analysis and evaluation strands in the geographic rope, however, let us repeat an important reason for learning geographic images: *the same word can (and often does) mean different things in different places.*

Consider, for example, the word "tree" (and the mental image it conjures in your mind).

What does "tree" mean?

It depends where you are!

In South Dakota or central Kansas, "tree" means a cottonwood, with spreading limbs and trembling leaves beside an often-dry creek.

In Ohio or central Europe, "tree" means a fan-shaped elm or ash, soaring upward among other tall trees.

In southern Alabama, "tree" means a pine with a straight trunk, pruned by fire and shade, with its branches far above ground.

In southern California or eastern Australia, "tree" means a gracefully twisted eucalyptus, planted in groves around buildings or in rows along the road.

In central California or Portugal, "tree" means a low oak, spreading its branches as it stands alone on a grassy slope.

In the cold forests of Canada or Siberia, "tree" means one of a million skinny spruces or firs, with a thick carpet of needles underfoot.

And on poor soils from Maine to Texas, "tree" is a scrubby juniper (usually called "cedar"). This tree can tolerate soils that are too thin and alkaline for good crops. It is almost like a mirror of the walnut trees that "told" settlers in Michigan what soils were fertile.

In short, the word "tree" means different things in different places. Moreover, people who know trees well can infer many other things about a place from the trees they see there. Early settlers in Michigan chose land that grew nut trees, because they had learned that such land was also capable of producing good crops. It follows that the better people "see" the features in a place, the better their inferences are likely to be.

The foundation for this interplay between observation and inference is laid in primary grades. We can show pictures of cottonwoods and fir trees, and students can memorize their names. If we take the extra step, however, and relate the traits of various trees to the environments they occupy, students will learn better. Structured thus, a lesson makes use of several cognitive pathways in what is rightly called a **neural network** in a child's brain.

Neural network --

model of the brain as a complex web of interconnected pathways

(this model forms the basis for a class of computer programs)

This link between fact and context works both ways. For example, to understand controversies about old-growth forests in Oregon or the "deforestation" of the Amazon Basin, a student must have a fairly accurate mental image of coastal or equatorial rainforests. To get that image, one must either travel to Oregon or Brazil or be exposed to a good photograph, film, video, or verbal description.

Principles that apply to something as simple as a tree are even more important when dealing with local meanings associated with value-laden words such as "housing," "ghetto," "government," or "church." These words also have different meanings in different places, and those differences are important in trying to understand the places.

Beyond the specific examples, a teacher should try to foster a general awareness that even familiar words can have different meanings in different places. Failure to recognize this simple but vital principle is a big failing of many magazine authors and talk show hosts. This is most unfortunate in a democracy: good intentions can combine with too-simple worldviews to form wildly erroneous analyses and prescriptions for our problems.

Appreciation of the fact that familiar words can have different meanings in different places is therefore near the top of the list of citizenship values engendered by a study of geography.

Geographic Theories -- The Second Strand

The explanatory theory strand -- learning theories to explain the locations of things

The second strand of the geographic rope deals with **explanatory theories** -- the sentences and paragraphs that help us understand where things are (and to explain why they are there). All people use geographic theories, whether they know it or not. "Let's go to store A -- it's closer." "Store B is on the way to Aunt Tilly's." "Store C costs too much -- too many rich people go there." "It's dangerous to park around Store D." "Store E is locally owned, so shopping there is better for our economy." And so forth.

The gravity model -- a theory to explain the amount of interaction between two places

The **gravity model** is a good example of this strand of geographic cognition. This useful theory tries to explain the amount of traffic, telephone calls, or other interaction between places. In elementary form, the theory says that places that are closer to each other are more likely to interact with each other than with places farther away. (That is subject, of course, to that well-known caveat, *all other things being equal.*)

The greater attractiveness of nearby places seems so transparently obvious that one wonders why some politicians and planners were surprised when travelers rejected the spacious modernity of the Dulles airport in suburban Washington, DC. Busy travelers seem to prefer the close-in convenience of Washington National.

Of course, variables such as noise, crowding, land value, alternative destinations, or personal tastes also have an impact on the amount of traffic we expect between places. The gravity model has many more elaborate forms that take those variables into account (Figures 3E and 3F).

Thus, like most good geographic theories, the gravity model cannot be "covered" at a particular point in the curriculum and then assumed to be "known." On the contrary, it should be introduced in primary grades, expanded in middle school, and extended in high school. Indeed, this theory has so many implications that it will probably form the basis for doctoral dissertations for many years to come.

Increasingly elaborate versions of the gravity model almost always require more and better input data. The skills of observation and measurement must keep up with advances in theory. The strands of fact and theory are therefore tightly twisted, in both research and teaching.

This twisting of the cognitive strands is also apparent in another important group of geographic theories, those that deal with

geographical diffusion (the spread of things from place to place). Something as familiar as the arrival of a new strain of influenza still comes as something of a surprise each year, because the exact pattern of spread depends on a complex interplay of environment, infrastructure, political borders, culture, personal mobility, and scale. These broad ideas often are chapter headings in topical geography books and will be discussed in greater detail later (especially in chapter 4, on the cornerstone ideas of geography).

Geographical diffusion -- the spread of diseases, innovations, rumors, and other things from place to place

The overhead projector is a useful tool for presenting geographic theories. Like a blackboard, it lets a teacher create or add to the visual message "in real time" while explaining a theory orally. Unlike a blackboard, however, an overhead projector allows some of the message to be prepared beforehand and saved from year to year. The overhead also allows better "body language," because the teacher faces the class. Table 3-2 has some design tips for making transparencies for geography classes.

Another thread in the theory strand -- personal theories may override scientific "truth"

Geographers should not just blithely borrow the word "theory" from scientists without bringing along another basic tenet of the philosophy of science: *theories are not, cannot be, right or wrong. At best, they can be better or worse than other theories.* You cannot "prove" a theory right; you can only provide some support for it or cast doubt on it.

The scientific test of a theory -- Does it handle the observed data better than any other theory?

This book is not the proper place for long expositions of some currently fashionable philosophical debates about positivism, paradigms, and post-modernist epistemologies. Here, let us just concede that geographic theories are not like Newtonian physics, all simple actions and reactions, causes and effects.

It is true that many geographic hypotheses do sound like simple cause-and-effect assertions: "farmers prefer fertile soils with the potential for high yields" or "railroad builders follow stream valleys in order to avoid hills." One does not need to look far into either agricultural policy or railroad history, however, to see that locational decisions were not always made on the basis of soil fertility or average slope.

For example, in 1995 the United States Department of Agriculture was trying to solve the "problem" of overproduction by paying some Iowa farmers to stop growing corn on highly fertile soils. At the same time, the same department was subsidizing farmers in other states to reclaim salt-laden desert soils or to drain coastal swamps in order to plant crops. This kind of policy schizophrenia seems to indicate one of two things: either a significant amount of geographic ignorance, or deference to a "higher" authority, such as "national security" or "political clout." The result is a geographic pattern of land use that must be interpreted in the light of the personal theories of the government officials as well as the "scientific" theories of observing geographers.

A glance at a railroad map adds support to the idea that simple cause-and-effect models rarely explain all of what we see in the landscape. The whole purpose of a railroad is to move goods from one place to another. Slope and distance are therefore of great concern for railroad engineers -- they try to minimize both.

Other factors, however, can also have an influence. For example, governments in many countries built railroads through specific regions in order to tie the regions together politically. The resulting pattern of routes may not be the most efficient way to move goods from producers to consumers (Figure 3G).

Vernacular theory -- cause-and-effect ideas that people in an area believe are true

Many of these seeming exceptions to the rule of common-sense geography are rooted in an equally common-sense fact: *the people in a place have their own theories.* These **vernacular theories** (also called "folk theories") are also topics for geographic study (that is one inevitable implication of being a "social science"). We can even make maps to show the prevalence of ideas that influence people to behave differently in apparently similar environments.

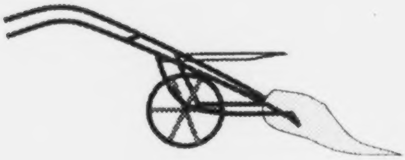
Good examples of this process are abundant near many national or state borders, where people on opposite sides of the border do different things with apparently similar land. For example, Montana farmers grow wheat on the same kind of land that Canadian ranchers use for raising cattle. The difference is due mainly to the way two governments define land and provide price supports and subsidies to farmers. (The National Council for Geographic Education sells a copy of a satellite image that clearly shows this contrast; for a publications list, write to NCGE, Indiana University of Pennsylvania, Indiana PA 15705).

Other parts of the world provide many other examples of vernacular theories in action. Together, these make up a huge outdoor "laboratory" that allows research geographers (and students) to study the interplay of human action and environment.

The result of this study is a set of interrelated theories about how people use land. These theories help us explain both the causes and the effects of particular kinds of land use:

why do people use land the way they do?

what consequences are likely to occur if people use land in specific ways?



Theories about land use

The core theory in geography is about the relationships between human activity in a place and the environmental conditions there. Let us, therefore, spend a page or two looking at land-use theory.

Factors that influence human use of land:

In simplest form, land-use theory says: *climate, slope, soil, and other natural features have an influence on land-use options and therefore on land value.* For example, look at the relationship between soil and livelihood in Indonesia. The soils in Sumatra are mostly nutrient-poor red *oxisols* (a slightly redundant phrase, since "oxisol" means nutrient-poor red soil in the Soil Taxonomy!) Nearby Java has dark volcanic *andosols*, easy to work and very productive. The inherent richness of the Javanese soil makes farmers more productive there, which helps explain the higher population density of Java. The rich soil also makes it worthwhile to invest in terraces, fences, and other structures to enhance their value for farming. This logically leads to the next theoretical idea:

- environmental conditions

Knowledge of how to use a resource has an influence on land-use options and therefore on land value. A fertile soil or mineral deposit does not just hand money to people. Someone has to recognize the potential value of a resource and learn how to use it. History is full of examples of inventions -- such as deepwell pumps or copper smelters -- that allowed people to use a new resource and led to a mass movement of people into formerly uninhabited areas. Any idea, rule, or invention that helps people use a new resource can dramatically change the relative value of places. (This is described further near the end of Chapter 4).

- cultural values and know-how

Infrastructure has an influence on land-use options and therefore on land value. Even a knowledgeable farmer cannot grow grain for a world market without an adequate **infrastructure** of seed producers, storage bins, transportation links, trading exchanges, and financial services. Once in place, however, an infrastructural feature such as a flour mill or an Interstate highway has a profound influence on the value of land around it (Figure 4O is a student activity based on this idea). The infrastructure in a place is usually the legacy of far-sighted visionaries of a previous era. Those are the people who put together the political and financial means to survey land and build roads, powerlines, schools, welfare systems, and other support structures.

- infrastructure

Awareness of the importance of existing infrastructure leads directly to the fourth theoretical idea: *previous land uses have an influence on land-use options and therefore on land value.* For example, the systems of land division used by Spanish priests,

- prior use

British lords, French refugees, and Jeffersonian surveyors were different. They were designed for their own place and time, yet they still govern the arrangements of streets, appearance of neighborhoods, and locations of traffic jams in modern cities such as San Diego, Detroit, or Saint Louis (Figure 3H).

- political borders

Acknowledging the importance of artificial lines can lead directly to the next theoretical idea: *political borders have an influence on land-use options and therefore on land value.* This is especially obvious in places where governmental rules or cultural values are different on opposite sides of the border. For example, look at the countries of the former Soviet Union and their European and Asian neighbors. In those areas, long-suppressed differences about the role of religion in politics are now exerting an impact from Bosnia and Chechnya to Kazakhstan.

- number of people

Finally (in this short list of important geographic theories): *the number of people in an area has an influence on land-use options and therefore on land value.* Ask a second grader in a small town what he or she would like to see built there. The answer is likely to include a wish-list of big and interesting things: Disney Worlds, shopping centers, sandy beaches, and so forth.

Reconciling a person's wish-list with the geographic realities of a given place is one purpose of geographic education. The blunt fact is that most communities have neither the resources nor enough people to support an infinite variety of big, interesting things. People have to make choices.

The goal is not just to understand what is impractical in a given place. It is equally important to explore what might be attainable there, if people wanted it enough.

Central place theory -- a theory to explain the size and spacing of stores, towns, or other service centers (see Transparency 2G)

Here is the dilemma: a society that tries to build a Disneyland in every small town is destined to bankrupt itself. Having said that, should we not take the next step and ask how much of the current construction of mini-malls, outlet malls, and megamalls makes sense? If we are not going to try to teach at least an appreciation for the need to ask such questions, will American consumers have anyone else to blame if they have too many malls and not enough factories or good universities to compete in the real world?

Location-allocation analysis -- deciding how many of something (such as convenience stores) to put in an area and where to put them

End of sermon: the practical benefits of geographic awareness include a healthy appreciation for the effect of scale and balance. *A community cannot expect to be efficient if it errs on either side:*

> *by providing too few services for its people, or*
>
> *by trying to build features in places that do not have enough people to support them adequately.*

The foregoing list of theoretical statements about gravity models, diffusion, and land use had two purposes. First, it is a summary of some key ideas that should be introduced in primary grades and reinforced throughout elementary and secondary school. (Choosing a proper vocabulary for these ideas is an important question in Chapter 7.)

Second, the list helps illuminate an important truth about geography as a discipline. What sets geography apart as both interesting and important for a smoothly functioning society is not the blinding conceptual richness of its theories. Rather, it is the elementary idea that even "obviously correct" theories can be profoundly place-dependent. A good explanation of landscape features in one place can be dead wrong in another.

In short, *explanatory theories may be different in different places.* As we said in Chapter 1, we study geography to find out why something we know, here, might be wrong in another place (or, conversely, why something that works in another place might not work where we are). The following chapters have more illustrations of this idea in other contexts.

Map-pattern analysis and map comparison

The nature and relationship among features in places can tell us whether a theory that works in one place will also work in another. Geographers have many ways to try to identify what features may be related. One of the most powerful of these is **map-pattern analysis** and its close companion, *map comparison.*

Map-pattern analysis -- looking for clues to help understand the density, spacing, alignment, imbalance, and other aspects of the arrangement of features on a map

Map-pattern analysis begins by making a map of a feature of interest. For example, a company might make a map of existing ice-cream stores. Looking at the pattern can help the company find "gaps" where a new store might be profitable. This is a widely-used kind of map pattern analysis, but it is hardly the only one. In fact, many of the most useful geographic theories began with someone just looking at a puzzling map and thinking about reasons for the pattern on it.

The first step is to look for **spatial imbalance** in the pattern. If most of the features are on one side of an area, perhaps one should investigate whether there is something else on that side that may be influencing the locations of things. Or perhaps there is something on the other side of the area that prevents the spread of the feature we have been observing. In short, map pattern analysis almost always leads to map comparison, either with a printed map or with a mental one stored in your brain. (Figure 2B introduced the idea of map-pattern analysis. Figures 8C and 8D show how this technique can help interpret the locations of Arab and Israeli settlements on the West Bank).

Spatial imbalance -- tendency for features to be located mainly in one part of an area

To build a set of useful mental maps:

try to remember one key line rather than a whole map

This kind of geographic analysis can take place by just blindly comparing maps in an atlas. It is much more efficient and effective, however, if the analyst has a set of well-chosen **mental maps** that can be used in trying to interpret a new map. Some useful "comparison maps" for a geographer who is looking at a puzzling map of the United States include:

- the zero-moisture-balance line. On one side of this line, surplus water is available to form rivers, grow crops, leach nutrients out of the soil, wear hills down, and perform many other "tasks" in the environment (Figure 3I).

- the four-month frost-free season, which is the effective limit for farming. Most grains cannot mature with a growing season of less than about 90 days, and the effective growing season is several weeks shorter than the "average" frost-free season (Figure 3J).

- the seven-month frost-free season, which is the effective limit for cotton and rice. These important plantation crops could not grow in places with a shorter-than-seven-month growing season (Figure 3K; compare with Figure 4X).

Pleistocene -- the "Ice Age" in recent geologic time, when glaciers advanced over much or Europe and North America

- the maximum extent of the **Pleistocene** glaciers, which covered much of North America and altered the terrain and drainage in ways that have many effects for farming, road building, and construction (Figure 3L).

- the position of the settlement frontier at various times. An understanding of the historic movement of European people across North America helps someone understand things as diverse as population density, town history, ownership patterns, ethnic make-up of the population, and architectural styles in different regions (Figure 3M).

- the states of the Confederacy. This pattern continues to have an influence on things such as education, income, religion, and voting, even though more than a century has elapsed since the Civil War (Figure 3N)

- the states where the Federal government still controls most of the land. This pattern has an apparent relationship to maps of population density, railroads, national parks, and suicides (Figure 3O).

Someone looking at another region of the world could also start with a set of simple climate maps. The length of the frost-free season is a key variable in most places. The 12-month line is especially important in tropical countries, because knowing where it never freezes can help explain many things about the patterns of crops, weeds, and diseases. The amount of precipitation is also a crucial factor in most places, especially those that do not have the technology for drilling deep wells or moving water long distances. (Figures 4T-4V deal with relationships between precipitation and the patterns of population and disease in Africa.)

In making short lists of simple maps for students to learn for comparison purposes, keep in mind two important differences between the United States and other countries. First, our towns and cities are relatively young, compared with those in many other countries. Second, the United States has had fairly strong political control over its own territory throughout its history. For these reasons, a teacher should encourage students to note the general extent of the Roman, Mongol, British, Dutch, French, Turkish, Japanese, Soviet, and other previous empires. Many areas still have land-division systems, road networks, and buildings that are legacies of their former controllers (Figure 3P).

Map-pattern comparison is such an important teaching and research technique that it is the reason we made the overhead transparencies half-size (see Table 3-2).

It is also why many geographers prefer simple maps, often with only one or two colors, to allow easy comparison.

A reader of such simple maps, however, must be able to judge their cartographic integrity -- one does not want to study the pattern on a map that has questionable accuracy. This is the reason for the long list of National Geography Standards that deal with map types and other **cartographic conventions**. Mapping is a language, which can be used well or inappropriately.

Cartographic convention --

accepted way to use map symbols to express particular ideas

It is not appropriate, for example, to use color shadings to show the total number of employees in each state (recall Figures 1A and 1B?). This use of the choropleth technique is the cartographic equivalent of saying "I is thirst" or "She hunger am." Those strange "sentences" may be intelligible, after some thought, but they are not proper uses of English words to communicate ideas.

To avoid misunderstanding, a person who is studying maps must be especially careful to make sure that the maps handle and display data correctly. The risk of confusion is increased whenever more than one or two maps are combined or compared. For example, suppose someone is looking at a map that combines information about slope, soil, and underlying geology in trying to locate a solid-waste disposal site. The map may have just a color pattern to show the acceptable areas, and therefore a reader does not know whether a particular unacceptable area is due to bad slope, soils, geology, or some combination of the above.

In sum, geographers often rely on mental maps to compare with new maps they encounter. The human brain, however, has limits.

A teacher should therefore choose the list of maps-to-be-memorized with great care and make sure they are appropriately designed. (Chapter 7 will show some ways to evaluate how well students have learned key map patterns).

Before we leave this discussion of geographic theory, we should repeat and underscore one point: *map comparison cannot prove a connection* (see Transparencies 4Y and 4Z for an illustration of this idea in a policy context). At best, map comparison can help support or refute an idea. More often, it can only suggest ideas for further investigation.

That caveat is true of all science. Experiments may support some ideas and cast doubt on others, but even the best-designed experiment cannot prove that a theory is absolutely true. Indeed, the real world, scientific experiments often raise as many questions as they answer.

In short, definitive answers are much rarer than tentative conclusions. Appreciation of that fundamental idea is a worthwhile goal in any class. At some point, theory-forming tends to grade almost imperceptibly into a third cognitive strand, the realm of personal opinions and value judgments.

Value Judgments -- the Third Strand

The evaluation strand --

learning how to judge the efficiency, fairness, and beauty of locations

The third strand of geography deals with personal opinions about topics such as landscape beauty, fairness, and tolerance. For example, a young child might evaluate some places as scary and others as safe-feeling. An older child might classify places according to the likelihood of having fun there. Citizens might evaluate the locational decisions of large corporations in terms of labor equity, environmental impact, or architectural integrity (to name just a few criteria that might be applied).

The relative importance of these criteria may well vary from one place to another (or from one group of people to another in the same place). In effect, geographic opinions can also have a geographic pattern! That means that people in different places can have different ideas about the proper places to put things such as stores, factories, offices, festivals, and bike trails.

Some geographic opinions have the force of law. For example, the Federal government once had a policy of refusing to guarantee home mortgages in racially mixed areas. This led to a process called **redlining**. Banks and insurance companies drew (red?) lines around neighborhoods where they would make fewer loans or charge higher insurance premiums or interest rates.

***Redlining** -- process of drawing lines around areas where a bank can refuse to make loans*

It does not take a genius to predict that home deterioration is a likely consequence if people are unable to borrow money for home purchase or repair. In time, this became evident on maps of topics such as house abandonment and arson, which often became severe problems in precisely the areas that had been redlined.

Simple-minded people sometimes blamed the people living in those neighborhoods for the deterioration. More knowledgeable individuals realized that a bad loan-guarantee policy had some logical geographic impacts that could be analyzed and even predicted. When confronted with the obviously bad effects of the practice, legislators and courts eventually outlawed redlining (although it seems to persist in some subtle forms in some cities).

The topic of redlining gives us a good example of the interplay between theory and opinion. It is not hard to formulate a plausible theory to explain why banks might do redlining. For one thing, old buildings can develop structural problems. Crime and vandalism may be higher in neighborhoods with poor people. Property value may not rise as fast in old city neighborhoods as in other areas, because there usually are more buyers for newer homes. In short, loans in some locations are inherently risky. That is a geographic theory that has substantial basis in fact.

People, however, can form evaluative opinions based on other geographic theories and facts. For example, they may realize that every person who lives in a risky neighborhood is not necessarily a risky investment. Or, they may conclude that redlining is a violation of civil-rights laws, to the extent that the housing in a city is segregated by race. Finally, they may simply be aware that a neighborhood once it has been redlined has almost no chance of recovery, whereas a law that prohibits redlining may afford at least a chance of rebuilding.

Here is a capsule view of the situation, stated in two short paragraphs:

> If there is no law against redlining, a bank that does not redline is at a disadvantage. More of its loans will be at risk, and it is likely to be less profitable than other banks.
>
> With a law against redlining, however, all banks are on an even basis. Every bank will have some risky loans, which will raise the costs for all borrowers.

The important point is that citizens in a society have to choose whether the benefits of an anti-redlining law outweigh the costs. In other words, they have to make informed decisions (whether individually or through representatives) about the logical consequences of geographic decisions about where to loan money. Those decisions will have an effect on the geographic patterns that we are likely to observe in the future.

For an international example of the same principle, consider the practice of "Japan bashing" (blaming Japanese competition for the loss of jobs when United States factories close).

On one hand, a factory that closes is not just a number on a balance-of-trade ledger at a global scale. It is also a provider of jobs and income at a local scale. Moreover, it usually is connected with other parts of the American economy -- factories in other places, as well as truck drivers, shipping clerks, warehouse owners, and financial institutions.

On the other hand, consumers usually prefer cheaper or better products. The money that people save by buying cheaper products can help solve other problems, thus creating more jobs. In short, paying more to get a locally-made product does not necessarily result in a better standard of living for the people in an area.

Capital flow -- movement of money from a corporation to its suppliers, workers, or investors

The issue becomes even more cloudy when we consider the effects of **capital flows**. Some of the profit from a Toyota made in Kentucky goes back to Japan. Most of the profit from a Ford made in Michigan stays in the United States. Many of the parts for the Ford, however, come from other countries. Meanwhile, many of the parts for the Toyota come from companies in many parts of the United States (Figure 3Q).

In short, a good understanding of the flows of goods, services, and money is essential if citizens are to form valid opinions about topics such as international trade, environmental quality, and residential justice (or even that buzzword of the 1990s, taxes). All of these topics have a strong geographic component, because designers, workers, investors, and customers are linked to each other by flows of money and influence.

Opinions about these topics can be formed at a surprisingly young age. This is especially true if students watch dramatic TV shows about evil businessmen during the same formative years in which their geography classes feature crossword puzzles and finding the names of states in a maze of letters.

(Of course, in a free society, people are entitled to whatever opinions they choose. Evaluative ideas about the geographic arrangement of things can be formed by doing good geography in school classrooms, by participating at town meetings, by listening to talk-show programs, or by watching TV dramas. One can derive some comfort from noting that the great unsung virtue of a democracy is that people have no one else to blame when they get their way. Here endeth the mini-sermon: one pervasive theme of this chapter is that people deserve what they get if they are willing to accept sound-bite opinion-forming, in which opinions stand in isolation, not woven together with supporting facts and theories.)

Here is the key question: how can a geography teacher at any grade level encourage thoughtful evaluation and other higher-order thinking skills? (That phrase, abbreviated "HOTS," is in vogue now, but one who accepts the idea of a three-strand rope might question whether evaluation is really "higher" than careful observation. That is the topic of the Postscript at the end of this chapter.)

Teaching about evaluation is like walking a tightrope between **dogma** and **relativism**. On one hand, a teacher should try to engender respect for other points of view. The phrase "reasonable people might disagree" is useful to underscore the possibility of honest differences of opinion.

Dogma --
"This statement is the only truth."

Relativism --
"One statement is as good as any other."

On the other hand, respect for diversity does not imply acceptance of any idea. To be acceptable, an opinion should be founded on sound analysis of well-gathered data. *In other words, the other two strands of meaning, theory and fact, should also be strong.* Encouraging students to form, defend, and evaluate opinions about fairness and beauty is not only part of geography, it is one of the main philosophical foundations for all study.

(Table 3-3 has some techniques for promoting healthy evaluation of ideas in a classroom.)

Before leaving the topic of value judgments, however, we might tease out one more useful thread. One of the most valuable roles of geography is to provide good illustrations of the fact that there may be more than one valid way of viewing a particular landscape feature or idea. As we said earlier, one must seek a medium ground between dogma and relativism.

In practice, this means an acceptance (or at least tolerance) of other reasonable ideas, and at the same time an ability to see flaws and reject unreasonable ideas. Careful search for and study of reasons why people might hold different opinions in different places is one of the best ways to develop this balance.

(Table 3-4 has some techniques for setting up a role-playing simulation so that it helps students wrestle with value differences).

Postscript: about those taxonomies of learner outcomes

Educators have long recognized that a variety of qualitatively different kinds of learning can occur. Bloom's taxonomy is a widely cited attempt to define and describe different kinds of learning. At the time this draft was being written, the phrase "higher-order thinking skills" (HOTS) was in vogue. The life expectancy of the phrase may not be very long, but the concept of qualitatively different thinking skills is likely to persist.

Simplistic model of "the scientific method"

Scientists gather data and formulate theories to explain them

This chapter used the somewhat awkward terms "strand," "domain," and "realm" instead of the more familiar "level" of cognition for a very important reason. Some popular books on "the scientific method" seem to imply that scientists go "up" a logical hierarchy from observation through theory to evaluation. In the real world, it's more like chicken-and-egg: *good theories enable us to observe better, and good observations are the raw material for better theories.*

More valid model of "the scientific method"

Scientists use theory to gather data and formulate better theories

Once we abandon the notion that observations are the "foundation" for "higher thinking," we can begin to appreciate that each strand depends on the others. It is true that evaluations are based on theories, and theories depend on facts for support. It is also true that images and facts do not just flow into the mind. On the contrary, they are filtered through a person's prior ideas and opinions. This is why people who have strong opinions may have trouble "seeing" contrary evidence.

A good first step in trying to open a closed mind is to cast some doubt on the "simplicity" of the process of observation or image-making. Asking young students to gather concrete facts about a place in a systematic manner is one way to instill a greater willingness to accept evidence even when it contradicts previous opinions. The "merely mechanical" process of observation should occasionally be set up as a "higher" authority than the abstract process of value judgment (see Figure 3R).

In sum, making a geographic observation (i.e., naming and/or describing something in a place) is no "lower" a form of cognition than developing a geographic theory. Image-building, analysis, and evaluation can all be done well or poorly; one is not necessarily "higher" than another. Any of the three strands can legitimately be described as the "highest-order" thinking skill.

Or, better, try to choose language that describes various strands of cognition as different but not necessarily higher or lower than each other. A refusal to accept the logical (or moral) superiority of theory, observation, or value judgment is the first step toward a sound model of the process of inquiry. As someone once said (I wish I could remember who): "A society that elevates philosophy as a noble occupation while demeaning plumbing as a base one is in deep trouble: neither its theories nor its pipes will hold water."

Table 3-1: Some design principles for image slides

1) Use several ordinary photographs of the same feature rather than one perfect one. Faced with multiple images of something, the human mind extracts the common elements, which are inevitably fewer in number and therefore easier to remember than all of the details of a perfect photo.

2) Focus the camera on just the object of interest. Keep foreground and background clutter to a minimum, and maybe even use the depth-of-field limits of large lens openings to keep foregrounds and backgrounds out of focus.

3) Avoid elements -- cars, movie marquees, billboards -- that date the picture too narrowly (unless establishing the time is part of your purpose). Few things damage credibility more than a photograph of a timeless object (say a farm crop, landform, or architectural style) that is partly ignored amid chuckles about a finned DeSoto, Beatles concert, or Ronald Reagan billboard on the screen.

4) Carry two cameras. The cost of getting somewhere is many, many times greater than the cost of film and developing. Take important pictures with both cameras, perhaps with different picture framing or exposure setting. Then, you have at least some pictures if the developer makes a mistake, you lose a roll, the dog chews a film open, a battery fails, the film falls into a puddle, the camera opens by accident, the film speed was set wrong, the colors faded on outdated film, or a thief stole the camera from a motel (to list just some of the things that have happened to my cameras in 20 years).

5) Mark each slide in a unique way. I use a bright permanent marker to paint a patch of color about half an inch square in the upper right-hand corner of the slide *as it is put in the tray for projection*. I then write a letter-number code on the patch with black marker. The colors tell me instantly whether the slides are all arranged in the tray right-side-up. The particular coding system you use does not matter much -- almost inevitably, some slides won't fit your categories, and some will seem to fit several of them. The important thing is to have a unique marking and therefore a single place to put each slide, so that you can find it again (I use an ordinary word-processor to list the codes, locations, dates, and several descriptive words for each slide; the search command in the program is usually able to find any slide out of the thousands I have. A database would be more efficient, and I might use one if I were just starting out, but I am not sure it is worth the effort to convert at this time).

6) Most important, take slides to illustrate a narrative, not to be a narrative. The most boring way to show slides is to introduce each one with the phrase, "and here is a slide of . . ." Students soon learn that they can nod off during a slide, wait for the magic phrase, snap up to scan the slide, write one or two notes, and nod off again. Five minutes of that and the class is lost. Far better to tell an interesting story and have slides that illustrate the story in a varied manner, including some fast sequences and some lingering over good examples. All this implies that the proper time to think about the story is when you are in the field, taking the pictures, not while you are sorting slides on the day before class. (A presentation outline that is written before going on a trip is also a great thing to have at tax-audit time; properly documented, a teacher's camera, film, and a fair share of travel expenses are deductible.)

For more hints along these lines, look at "One Commandment and Ten Suggestions: Teaching the Video Generation with Slides," *Journal of Geography* 84 (1985):15-19.

Table 3-2: Some design principles for overhead transparencies

1) Design transparencies to be half of an 8-1/2 by 11 page. This practice has four advantages. The first is financial: transparency film is expensive, and this effectively doubles your budget. The second is pragmatic: a half-size transparency will work even with a smaller screen or a room that prevents some people from seeing the whole screen. The third is substantive: it is easy to compare maps when you can project two at a time. The fourth is organizational: you can put an outline on one transparency and leave it up while exchanging the other transparencies; other forms of organization will suggest themselves once you get used to that much flexibility.

2) Use color to highlight specific features on the transparency. Shading with a yellow permanent marker, for example, can transform a hard-to-follow meandering black line into an instantly recognizable continent. A water-color marker can be used to highlight feature "on the fly" as you discuss the transparency or respond to questions; a few seconds with a moistened tissue can clean the slide for the next use.

3) Follow standard conventions for cartography. Use larger symbols or darker shades for large amounts of something that is counted or measured. Use graduated symbols for "raw" data (absolute measurements or amounts, such as rainfall, population counts, or earthquake intensities). Use choropleth or isoline shading for "cooked" data (per-capita averages, percentages, or other PER ratios, such as yields per acre or children per family). Use equal-sized symbols for nominal data (things that are different in kind but not in importance or amount, such as copper and iron mines or Catholic and Baptist churches). WARNING: many newspaper and magazine editors, alas, are cartographically illiterate; using their maps intact, without encouraging students to evaluate them and suggest improvements, will send a mixed message and perpetuate this particular form of ignorance).

4) Use big type. Putting a typewritten page through a transparency machine is technically feasible, but it is pedagogically indefensible. Here is a simple rule of thumb: write letters so big that they appear grotesque to you, and then double their size. Remember one fact: you are not designing transparencies to be aesthetically pleasing to a teacher looking at them from the front of the room. You are designing them to be easily legible by a tired, vision-impaired student in the back of the room. Moreover, once you have taken the time to make a transparency, you will probably use it several times, perhaps in different rooms, and therefore you should modify the last sentence to read "for a vision-impaired student somewhere in the worst room in which you may be asked to make a presentation." In practice, that usually means a minimum type size of about 16 points (typewriter type is barely one-half of that).

5) Design transparencies so that they communicate a full message without verbal explanation. People do not pay attention all of the time, and one should make it possible for someone to "catch up" just by looking at the transparency. In practice, this means including a clear title, legend, scales or north arrows (if necessary), and the source of information. The latter item is the only one that can violate the rule of type size -- 10-point type (still a bit bigger than standard typewriter) is OK for citing a source so that you can read it to the class if necessary and/or find the data again to check or update the transparency.

For more hints along these lines, look at "Ten Suggestions and One Commandment: Using Overhead Projectors in Geography Classrooms," *Journal of Geography* 84 (1985):75-79.

Table 3-3: Some design principles for value discussions

1) Have students do background reading on an issue; then have them flip a coin to decide what side of the issue they will present, either orally or in writing. This works best if the teacher makes it very clear that the student will be evaluated on their research and logic rather than the "correctness" of the opinion expressed.

2) Occasionally explain an idea in a persuasive way, and then admit that you do not believe it. This is a seductive and dangerous ploy, because it can promote cynicism among students, but that is no reason to avoid using such a powerful teaching device. Introducing and then criticizing a persuasive idea is better citizenship training than setting up obviously wrong straw people and then demolishing them. The key is to admit that reasonable people might hold the idea that you have just explained, but that for good reasons you do not. Then go on to explain your reasons, while admitting that others might reasonably disagree.

3) Take a geographic opinion poll and analyze the results. For example, ask students to write the names of the ten states (or five parts of the city, etc.) they would most like to visit. Then have them (in groups or as a class) count the votes for each state. This becomes a good topic for geographic analysis when students take the next step, which is to make a map of the results. For example, in a class of 20 students, you might hand out base maps and have students shade a state with a dark color if it received ten or more votes. Shade states that got 3 to 9 votes with an intermediate gray, and leave states with fewer than 3 votes white (adjust numbers to fit different class sizes -- the goal is to have about one third of the states in each color category). The result is a three-class *choropleth* map of travel preference. The final step is to analyze that map. What might explain the pattern of preferences? This activity also helps to reinforce knowledge of state or other locations, and it can take a wide variety of forms. For example, ask advanced students to list five African countries that they think are least likely to have civil wars (like the recent one in Rwanda), and give them a few days for research before compiling the results for class discussion. Analyzing maps such as these helps students learn to draw a distinction between facts and "meta-facts" (such as the kind of horse-race opinion-poll reporting that unfortunately substitutes for analysis of issues in too many political campaigns these days).

4) Use a *semantic differential* to elicit opinions about a place. This is a kind of test in which respondents are asked to judge whether they think the place is closer to one extreme or another on a number of scales. For example, you might project a slide and ask students to put a mark on each line of a list such as the following:

hot	___	___	___	___	___	cold
ugly	___	___	___	___	___	beautiful
fair	___	___	___	___	___	unfair
dangerous	___	___	___	___	___	safe
strong	___	___	___	___	___	weak
poor	___	___	___	___	___	rich

Tabulating results can provide materials for interesting discussion and further research. For example, ask "What in this picture made so many of us describe it as rich?" "What evidence in the picture might get someone to express [name an opinion held by only a few respondents]?" By hiding individual responses in a summary of group opinion, a teacher can get students to address controversial issues with less emotional involvement, defensive posturing, or tacit assumption of consensus (e.g., "everybody thinks such-and-so;" they obviously don't, and it can be revealing to find out why).

Table 3-4: Some design principles for role-playing simulations

1) Decide in advance whether the primary goal of the role-playing simulation is to enhance research skills, presentation skills, or awareness of other points of view. It is very difficult to design a simulation that accomplishes all three goals equally well.

2) A research simulation uses fairly open-ended directions, so that students can explore on their own. A successful information search, however, tends to make it hard for students to concede that another point of view is worthy of consideration. Given these motivational contradictions, it pays to design evaluation criteria that focus on research, data analysis, case organization, and/or graphic design, rather than tolerance.

3) A presentation simulation requires a set of fairly evenly matched cases. Give each team or individual a background role-card with some suggestions about graphs or maps that could be prepared to help the case. For example, four teams may prepare presentations to the International Whaling Commission. Each team is given some key facts:

   American ships are old and slow, and therefore that team might argue for a bag limit (a limit on the number of whales that each country is allowed to catch).

   Japanese ships are big and fast, and therefore that team might argue for a season-length limit (they'll catch more than other countries can in a short season).

   Russians have developed a harpoon that can catch whales at a distance, and therefore that team might argue for reducing the number of boats for each country.

   Norway has a long history of whaling, and many villages depend on it for jobs, and therefore that team might "pull on the heart strings" for preferential treatment.

   With cases roughly equal in strength but qualitatively different, evaluation should depend on which side argues its case most persuasively.

4) A values-comparison simulation requires a mechanism to get students to think beyond winning the debate and to ask about the validity of other positions. Here is a famous example: groups try to trade cards until each group has the same number of cards of each color (I know that rule is ambiguous, but that's part of the simulation):

   One group has 12 red cards and is told that people in their culture refuse to negotiate with anyone who does not look them in the eye and shake hands when they meet.

   One group has 20 blue cards and is told that it is a mark of respect in their culture to avoid eye contact and to speak softly.

   One group has 24 green cards and is told that in their culture a person should avoid bodily contact with strangers but should start a negotiation with a gift of a card.

   One group has 30 yellow cards and is told that they should try to make even trades and never accept a gift without making one in return.

   The heart of this simulation is a five-minute trading session. Each person in each group acts individually to try to make trades. After each trading session is a five-minute planning session, in which people meet with their own group to compare notes and plan strategy. Repeat as often as seems worthwhile, and add, subtract, or change roles if it seems appropriate. This is a very flexible "engine" that works in many ways; students soon learn that "sensible-sounding" cultural rules can still lead to misunderstanding.

Role-play simulations work best if the "engine" is easy to explain and the rules can be modified to fit specific objectives. Moreover, a teacher must be willing to spend almost as much time debriefing as running the simulation. The debriefing does not have to happen immediately; one might recall the simulation a month later to help make a point: "remember when you were trading cards; you had to learn about other cultures in order to reach your common goal."

4

FOUR CORNERSTONES:
FOUNDATION IDEAS OF GEOGRAPHY

All knowledge begins with a *creed*, a statement of essentially unprovable faith.

A scientist, for example, starts by accepting this assumption: what we observe is the effect of one or more causes that can be identified and understood. Philosophers, liberal-arts graduate students, and college sophomores rather gleefully point out that we cannot "prove" the idea of causality. Scientists just assume that it occurs and proceed from there. Despite the essential unprovability of its basic assumption, science has developed a sizeable body of statements that are useful (even though we cannot say they are absolutely true).

For example, automobiles move "under their own power" (that's what "automobile" means!) because car builders accept a theory that says an electric spark in a mixture of gasoline and air will "cause" a mild explosion, which in turn can be harnessed to move pistons, crankshafts, and eventually wheels.

Geography also begins with a statement of faith.

A geographer's creed

> A "pure" geographer (a person who uses geographical methods to learn about the world) starts with a creed-like statement about location: "I believe that there are reasons for things being where they are."
>
> An "applied" geographer (one who uses geographical methods to do things in the world) puts a slightly different twist on the same creed: "I believe that people should have good reasons for locating things where they do."

Both of these creed statements underscore the importance of location, because that is what makes geographers geographers, as opposed to scientists or philosophers. In other words, geography is not *all* of knowledge; it is just the kind that deals with location.

Reasons,
real reasons,
and
unreasonable
reasons

Caveat: although geographers believe there are reasons for things being where they are, they also have to realize that those reasons may not always seem reasonable. For lack of a better term, let us call this the "warm-purple-glow syndrome." Here is an example, from a teacher's unit on city location. A given town is usually located where it is because of a plausible reason: a defensible site, perhaps, or a mineral deposit, good river crossing, fertile soil, strategic location in a mountain pass, proximity to a freeway exit, etc. Occasionally, however, a town is located where it is for purely quirky reasons: some individuals, whose sanity might even be questioned, just decided to start a town there, perhaps because they felt a warm purple glow in their big toes when they walked across the site.

(reasons: the
"warm-purple-glow"
syndrome)

That reason for locating a town may not make sense to anyone else, but it is still a reason. Its "unreasonableness" is a caution to those who hope to find a tidy explanation for any landscape feature. The fact is: some features just do not have reasonable reasons for being where they are.

This is a difficult balance for a teacher. On one hand, we want students to appreciate that the world is organized in ways that seem capable of being understood. At the same time, we have to acknowledge that some parts of it do not seem to make sense. Some of those parts may make sense in the future, after we learn more about the world. But the locations of some things will never make sense, because in fact they made no sense when they were first put there.

chaos theory --

big effects often follow
tiny (and therefore
unpredictable) causes:

a California storm
may be triggered
by a butterfly landing
in a field in Japan

This is a geographical variation of **chaos theory** in physics, which says that big observable events are often consequences of processes that are set in motion by tiny (and therefore hard-to-predict) events. At the extreme, chaos theory points to aspects of quantum mechanics such as the random radioactive decay of atoms, the ultimate in unpredictability. This kind of philosophic speculation is addictive for some people, who go on to make sweeping statements about the essential unpredictability of the universe. In fact, however, even radioactive decay is quite predictable at some scales of analysis -- we may not know which atoms will disintegrate in a given second, but we can predict how many will, and we can design reactors to harness the resulting power. So, even though questions about ultimate causes of individual events cannot always be answered, we can still draw useful conclusions about typical behavior of large numbers of events.

The rest of this chapter (and the discipline of geography) is devoted to the parts of the world that do (or at least might) make sense at a geographical scale of analysis. This long caveat is just a caution for two groups: those who might hope that we could find a geographical explanation that fits everything they see, and those who think that chaos theory means that nothing is predictable.

The analytical study of geographical phenomena rests on four tightly interrelated ideas: **location**, **place**, **link**, and **region**.

Four cornerstones of geographical study:

- *location*
- *place*
- *link*
- *region*

Each of these words has a specialized meaning for geographers. We also should admit that each one is fuzzy enough that some geography teachers are uncomfortable with the term and prefer to use another word for the same idea (e.g., "site" instead of "place"). As a result, there is an ongoing dispute about terminology in geographical journals. Don't worry too much about it. Terms at this basic level are almost always words like "cause" and "effect," which seem clear enough until you realize that nearly every effect is in turn a cause for some other effect farther along the logical chain. At that point, the logic seems to lose most of its clarity.

This fuzziness is not easy to explain to a child looking at you with the peculiar expression children reserve for adults whose density seems to transcend understanding. For that reason, and for other reasons we will discuss in chapters 5 and 9, I would rather just say that the taxonomy in this chapter may be of some value in writing curricula or talking with administrators, but it is not the kind of thing I would actually try to teach in an elementary classroom.

With the reader's permission, then, let us just go on to consider these cornerstone ideas -- location, place, link, and region -- and how to present them in the classroom, without getting hung up on disputes about the appropriateness of the words themselves.

Location

The first cornerstone of geography is the concept of location: you have to know where something is before you can study it geographically.

Location -- position in space

Once you know the location of something, then you can study what is **spatially related** to it: in other words, what is next to it, upwind from it, between it and the ocean, just beyond it, and so forth. Those relationships, in turn, have effects that we can measure, analyze, understand, and perhaps control.

spatial relationships -- what geographers study

So, to repeat, you have to know where something is before you can study it geographically.

Unfortunately, that elementary-sounding idea leads directly into a terminological circularity, because you can know location only if you also know at least one other basic spatial idea -- distance, direction, proximity, or enclosure. (Go ahead -- try to describe where you are sitting right now without using any of those ideas!)

Some textbook authors muddy the water even more by dividing the concept of location into two categories:

relative and absolute location

relative location -- position expressed in terms of one or more known locations: "the library is between Smith and Jones Hall" or "the pool is half a mile north of the water tower."

absolute location -- position expressed in terms of a mathematical grid or coordinate system: "my house is at 1920 First Avenue" or "Memphis is at 35 degrees north latitude and 90 degrees west longitude."

Latitude -- angular distance north or south of the Equator

Having explained the distinction, I have to admit that I do not believe it is either true or very useful. For one thing, even something as precise-sounding as **latitude** is not an absolute value. On the contrary, it is defined as angular distance from the Equator. Think about it: that is an arbitrary measure of distance away from an arbitrarily chosen line. In other words, it is almost a textbook example of relative, not absolute, location (Figure 4A).

Likewise, house numbers are usually based on distance from some central point, but the center is almost always arbitrary and the scale is rarely uniform. For example, 1925 First Avenue is probably located somewhere between 1920 and 1930 First Avenue. In the real world, however, it seldom is exactly halfway between the other two addresses, and in fact it usually is on the opposite side of the street from them (since it is an odd number and they are even).

In other words, there really is no such thing as absolute location. There are just a large number of different ways of expressing relative locations. Some of those ways are more general and/or more precise than others, but none of them is absolute in any meaningful sense (do I hear Einstein nodding his head in his grave?)

For this reason, the textbook distinction between relative and absolute location seems at best artificial and in most cases pedagogically unproductive. It is probably better just to outline a number of different ways of describing location. One could say, truthfully, that the idea of location is so important that people have invented many different ways of expressing it (Figure 4B).

In any case, children are usually much better than adults at just "doing location," without concern for its ambiguities (as long as teachers and other adults do not impose artificial distinctions such as the one described above). Human children depend on others for food and shelter; getting lost is therefore not a recommended way to survive to adulthood in many places! Locational skills have been an essential survival tool for the human species, and the human brain is therefore adapted to acquire and process locational information quite intuitively.

The fact that locational terms and concepts are both intuitive and important does not obviate the need to teach them systematically. Various cultures have different ways of communicating locational information. For this reason, a typical primary curriculum in geography (in any culture!) devotes a lot of time to mastering various ways of describing and manipulating locational ideas.

Instruction about location will usually be more effective if it is couched in terms of meaningful questions and familiar features. Figure 4C is one time-tested way to show students how to use different terms to describe the same location. This map is simplified from a map of a mall in upstate New York. It's OK for class demonstration, but for student practice it is definitely preferable to use a map of a local mall if one is available (or look for a map of a theater, stadium, golf course, etc.).

Similar strategies can be used to teach conventional "vocabularies" for related **spatial primitives**: distance (Figure 4D), direction (Figure 4E), and enclosure (Figure 4F).

Spatial primitives --
position,
distance,
direction,
enclosure

These sample activities all have two features in common. First, students use several conventional "languages" to express ideas about location, distance, direction, and enclosure. Translating between languages is the highest level of mastery, because it demands thorough understanding of each language. Moreover, an activity that requires translation can be a useful diagnostic tool. It helps teachers identify students who have trouble with specific languages and could use reviews.

People have
many "languages"
for expressing
spatial ideas

Second, these activities involve real places (even though they may be introduced with simplified demonstrations). This provides an intuitive rationale for the activity -- students can hardly say that activities are meaningless busywork when they are so obviously related to real-world issues. Moreover, society expects geography teachers to instill in students a common mental map of important locations in the local area, the nation, and the world.

Some magazine and newspaper articles seem to imply that this is the major purpose of geographic education. Most geographers heartily disagree with the idea that geography is nothing but placenames, but it seems counterproductive to go to the other extreme and to teach fundamental spatial concepts only with maps of imaginary places (and unfortunately, often with cutesy names such as Big City, Middletown, and Farmburg).

Activities should involve real places

Using maps of imaginary places does not make a teacher's job any easier. In fact, it is probably more difficult, because students may legitimately question whether the imaginary maps deal with ideas that are worth knowing. So, absent a clear and compelling rationale for creating imaginary places, let me assert a general principle: *in general, it is preferable to use real places in geographic instruction, and to choose those places with care.*

> (Third edition note: no other statement in this book has generated as much reaction as this one. Many teachers commented or wrote that their students "really enjoyed" making or reading maps of imaginary landscapes. No doubt. But I submit that students enjoy interesting maps, and the valid test is not whether they enjoyed the imaginary maps more than a lecture or other typical class activity. The valid test is whether they would enjoy working with maps of interesting real places just as much, or even more. If that is true, then why not use real places? Students would use more of their brains, learn on several strands, and still have fun!)

One guide for selection of real places for classroom activities might be their importance in performing other everyday tasks such as navigating around town or reading a newspaper.

I would even go so far as to say that this should be a criterion for the selection of textbooks and other instructional aids. As you review various books, ask: "do the placenames in them seem to have been selected with some care, so that at the end of the class students have a reasonable mental map of the world? Or does the list of placenames represent a significant bias?"

Varieties of placename bias

Placename bias can take a variety of guises:

Eurocentric or Anglocentric bias. Exclusive focus on landscapes made by English-speaking Europeans is not appropriate. After all, a large part of the population of the United States did not originate in Europe, and many of the Europeans who came here did not speak English.

"Categorilla" -- term coined for the longest, deepest, highest, or otherwise most exceptional feature in each category

Exotic bias. Mention of exceptional features is a way to grab attention, but too much focus on **categorillas** does not help students put real-world events into perspective.

Upscale bias. Beautiful scenes and the lifestyles of the rich and famous are likewise not the whole picture.

Problem bias. At the other extreme, an endless litany of catastrophes and other problem places may promote blame-seeking, cynicism, and a kind of numb fatalism.

In short, the list of placenames that are emphasized or (just mentioned) in a geography course is a good measure of the quality of the course, even though the mastery of placenames is not the sole (or even the primary) purpose of the course. The list of placenames is a prescription that tells students what kinds of places are important to know. The list is a goal that tells teachers what ideas are important to emphasize. Finally, it is a summary of course content, for scrutiny by administrators and legislators.

Some textbook authors start by asserting that "this is a book on modern geography, which is not about placenames; it's about the application of spatial skills." That assertion does not contradict the fact that the list of locations you choose to mention is a clear indication of what you think is worth studying. A book that uses imaginary or exotic places to illustrate principles is sending two clear subliminal messages:

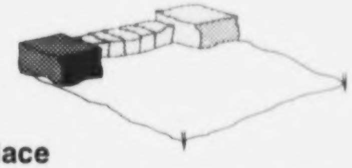
> "We're too lazy to do the homework needed to show how this skill or principle applies in a real location."
>
> "Knowing real locations isn't very important after all."

Those are powerful messages; do we really want to send them?

Should teachers use maps of imaginary places?

Sometimes, but not as often as some do

This concern for real-world places does not mean that one cannot simplify the conditions in a real location in order to illustrate a point. We do that every time we make a thematic map (recall chapter 2?). Simplification, however, should not violate the basic principle: *at the end of a geography course, a student should have a fairly good mental map of the locations of countries, large cities, major rivers, and other important features within the area being studied.* (You might even tabulate the places mentioned in this book and critique that list -- we practice what we preach!)



Place

The second cornerstone idea of geography is encapsulated in the deceptively simple words "place" or "site." These terms embrace the characteristics of a location, the features, processes, and human actions that make the location meaningful.

A location is a position in space; a **place** is the sum total of all the features that occur at a given location. That may seem like a fussy distinction, but it allows a geography teacher to highlight the difference between the skills needed to define a position in space and the quite different skills needed to describe the features there.

Place --

the mix of "natural" and "artificial" features that give meaning to a location

Each location is unique; no two places have exactly the same set of natural processes and human actions. That realization is an important learner outcome even at a very young age.

classification --

putting things into categories

The ability to discriminate between places is a prerequisite for the process of **classification**, which is one of the methods that people use to organize the world around them.

> (Teaching about classification has been criticized by some educators as politically incorrect: Eurocentric, male-dominated, and hegemonic. That is correct, if people are taught to accept a classification without question. But if people learn that a classification is nothing more (or less) than a human attempt to reduce the bewildering complexity of the world in order to see what might be happening more clearly, then the chance of blindly accepting another person's categories will be reduced. Teaching the logical basis of classification can therefore help liberate us from those who would try to impose their categories as if they were the only truth.)

The purpose of classification is to simplify the world so that we can see relationships better. The process of putting places into categories begins with the realization that some places are more alike than others.

Someone trying to classify places has to strike a balance between two opposing ideas:

> Each location on earth has a distinctive mix of dissimilar forces that interact to produce unique features. For that reason, no two places are alike.
>
> Each location on earth has some dominant forces that have a number of predictable consequences. For that reason, places in similar locations tend to be similar.

Subsidence --

zones of sinking air some 25 to 30 degrees north and south of the Equator

Consider a location in North Africa as an example. At a latitude of about 27 degrees north of the Equator, this place is in the zone of sinking air known as the **Subsidence**. Atmospheric subsidence is a predictable consequence of a few simple but very powerful forces:

1) The noon sun is almost directly overhead at the Equator (technically, the noon sun is never lower than about 23 degrees down from directly overhead).
2) Intense vertical rays of the sun heat the ground (that is why the Poles are cold, because the sun never gets very far above the horizon).

3) Heated air rises, causing clouds and rain, often at very predictable times -- a classic example in New Guinea has a storm between 2 and 4 p.m. about 300 days a year.

4) This risen equatorial air is forced north and south by continued updrafts, day after day, as long as the sun keeps shining.

5) Air moving away from the Equator at high elevations (say 50,000 feet above the ground) is cooled, squeezed together (because the earth is round), and turned to the east (because the earth is rotating -- see Figure 4G).

6) Cooled, compressed, and deflected air sinks toward the ground, and this sinking is most pronounced about 2000 miles north and south of where it was pushed up.

This is where we should probably stop the explanation even for high-school students. There are good fluid-dynamic reasons why the subsidence occurs about 2000 miles away from the Equatorial updrafts. That being the case, the distance would be different if the earth were bigger (or smaller), the sun hotter (or cooler), the air denser (or thinner), the surface rougher (or smoother), or the rotation faster (or slower).

At some point, however, the details threaten to get in the way of the main point, which is that air will be sinking downward at latitude 27 degrees north (and south) as long as the sun keeps shining and the earth keeps spinning (Figures 4H and 4I).

Sinking air, in turn, has a whole bunch of predictable consequences for a place in the latitude of the Subsidence:

Consequences of sinking air

Sinking air gets warmer, and therefore the place tends to be hot. It is no accident that the high-temperature record on each continent is in the Subsidence zone.

Relative humidity decreases as air is warmed, and therefore the place tends to be dry. It is hardly surprising that the list of areas affected by Subsidence reads like a Who's-Who of great deserts: the Sahara, Arabia, the Atacama, Kalahari, Mojave, and Australian deserts (Figure 4J).

Dry air puts stress on plants, and therefore plants in the Subsidence zone are sparse, short, and usually equipped with moisture-gathering or moisture-saving structures (such as deep roots, water-storage tissue, photosynthetic stems, protective spines, leathery leaves, or chemical methods of reducing competition from other plants).

Dry soils tend to accumulate salt, which is left behind as water evaporates. Soils in the Subsidence zone usually have an excess of sodium, potassium, or calcium salts.

6

Pediment --

"apron" of loose rock around a mountain range in a desert climate

Dry winds and occasional intense thunderstorms create distinctive landforms as they move sand and dust around. A place in the Subsidence probably has rocky slopes, sculptured cliffs, gravelly **pediments**, sand dunes, and playa "lakes" that are often dry.

Dry weather, rocky slopes, and salty soils are not good for farming or grazing. For that reason, human populations in the Subsidence zone tend to be sparse, except near rivers or in places with enough wealth to bring water from elsewhere. (Irrigated fields along the Nile River and air-conditioned casinos in Las Vegas seem to have nothing in common, until you see them as different ways to solve the same problem: how to live in a dry place).

In short, the basic cause -- sinking air -- has a whole set of predictable consequences: cloud-free sky, low precipitation, high temperature, salty soil, sand dunes, sculpted cliffs, pediments, sparse population, and problems for human use. One can start to study these interactions by noting the similarity of map patterns of various phenomena. The assumption is that features that occur together may also be related in some other way (we'll say more about this in the section on regional comparison).

If possible, the features of a specific place should be taught as a set of causes and effects, with a minimum number of important causes and a maximum number of plausible effects. Unfortunately for students seeking easy explanations, the important causes are not the same in every place. For example, sinking air is an important causal variable in all Subsidence areas, but not near the Equator or on a windward coast such as Norway or New Zealand. Likewise, the Islamic religion expanded to become a dominant force in some Subsidence desert areas, but it is much more influential in North Africa and Southwest Asia than in Australia or Latin America.

The selection of traits that seem to have important causal influence is part of both the science and the art of geographical analysis. Insofar as place-analysis of this kind is a science, the proper tests of a hypothesis about relationships in a place are the same as in any science:

Tests of a hypothesis

Does the theory handle the observed data?

If the theory handles the data, does it also fit with other generally accepted theories?

If several theories handle the data, does acceptance of one have undesirable side-effects?

If a theoretical statement cannot pass these three tests, we should either reject it outright or modify it before we act on it.

The task of seeking plausible theories to organize teaching about places is not easy. The alternative, however, is a truly gruesome prospect: a geography class that consists of rote memorization of all of the traits of an infinite number of places. In other words, the ideas of map-pattern similarity and geographic causality are useful tools to help keep the total mass of information manageable.

This does not mean that every place on earth should be treated as a simple consequence of a small number of powerful causes. In the real world, some places are better defined as the result of the interplay of a fairly sizeable number of seemingly independent forces. This observation has led some people to propose that the best way to teach geography is through the use of **checklists**.

Checklist --

data form with a list
of labelled blanks
to be filled in
for each country

According to this proposal, students should be taught to organize information about places by filling the blanks on a form like this:

climate: rock: ___________
high temperature ___ soil: ___________
low temperature ___ minerals ________
precipitation ___ ________

other blanks ask for information about crops, language, largest cities, major exports, etc., etc., etc.

This checklist approach, unfortunately, tends to work well for the first few days. Many students actually seem to enjoy using a checklist to impose some order on the mass of information they can find about a place.

The problem with a checklist method is the same as with any standardized kind of instruction: it is basically a cutting block, and the knife soon gets dull (recall Chapter 2?). After ten or fifteen states or countries, students reach a stage of numb acquiescence, if not outright revolt over the tedium of it all.

The solution to that problem is to maintain the rigor of the checklist while varying the form. In this way, students acquire the information needed to compare places without the boredom involved in actually filling out a checklist for every place. For example, students can:

1) match photographs of places with verbal descriptions of their climate and landforms, or with statistical profiles of their populations or economies (this can be made into a game with an appropriate bulletin-board display);

2) use Census data to construct population pyramids from several countries and match them with descriptions of the economies of those countries (instructive examples might include Iran, Kuwait, Somalia, and Rwanda);

Spreadsheet --

computer program that arranges data in rows and columns for analysis

3) use a **spreadsheet** to calculate per-capita values by entering and dividing absolute numbers for various places to be compared (e.g., figuring available space per person by dividing the total area by the population in a range of dissimilar countries such as Mongolia, Indonesia, Japan, and Singapore);

4) use a computer data bank to search for information about several places (e.g., the number of hotel rooms, mobile-home parks, and real estate agencies in a high-income resort-retirement area such as Palm Springs, California, and a middle-class area such as Bella Vista, Arkansas, or Deming, New Mexico; see Transparency 6B);

Transect --

line along which one observes and records data

5) gather information from thematic maps and atlases and record what they might observe along a **transect** across an area (e.g., the kind of natural vegetation they would expect to see at specific intervals along a road from Cairo to Capetown, or the size of houses they would see along a specific bus route);

6) compile information and prepare one-page profiles of a place (like Transparency 3B). This works better if set in the context of a plausible real-world situation. For example, suppose a store owner is thinking of building a new store in a particular area. The student product is a profile like what many American counties and towns prepare as part of their economic development effort. A county or town Chamber of Commerce will usually give travelling teachers some those publications. A box of profiles of other towns is both a good illustration of applied geography and a useful resource for students;

7) prepare posters or other descriptions and exchange them with other students, either in their own class, in other classes, or even in other states or countries (through the mail or a computer bulletin board);

8) gather information and write the first few pages of a mystery novel set in a specific place; those pages should help set the scene by noting the features of the place that are likely to influence the action or otherwise affect the main characters;

Reference map --

shows the locations of a variety of things in a specific area (see chapter 2)

9) Prepare **reference maps** that show how various features of a place are arranged and connected with each other. The form of these maps can range from detailed maps to impressionistic cartoons. The goal is to record the features that are most important in making the place what it is.

In short, there are many ways to impose discipline on the process of gathering, organizing, and presenting information about specific places. This part of the class has obvious practical value, since the description of places is one of the jobs professional geographers are asked to do. After all, someone has to prepare all the different kinds of community profiles that are used out in the real world:

- local-issue briefs for political candidates,
- market analyses for store managers,
- background papers for trade or labor negotiators,
- context outlines for journalists,
- neighborhood reports for real-estate appraisers,
- area profiles for church or school administrators, and
- relocation packets for individuals or factory owners seeking new locations.

The list of nine options on the previous page did not include what is perhaps the single most important method of geographic place-analysis: the process of making **thematic maps** as a way of gathering and organizing information about places. As described in Chapter 2, this is the other blade of the place-analysis "scissors" of modern geography. That realization could serve as a transition to the next cornerstone, the exploration of links between places.

Thematic map -

shows the patterns of a few features in a fairly large area

We should not leave the section on place, however, without noting three other very important aspects of place analysis: the cultural definition of resources, the legacies of past occupation, and the pervasive influence of land division.

The first principle is that people, not nature, define what is a **resource**. For example, a rich deposit of uranium ore is of no value for a culture that does not use uranium. People may live in that place for generations, raising food, building houses, and leaving other imprints on the local landscape. The tabulation of important landscape features in the place, however, will not include uranium mines until the invention of nuclear reactors (or the arrival of a culture that uses uranium, or some kind of contact with people who want uranium). *Until there is a demand for it, an ore deposit is not a resource.*

Cultural definition of resources --

people decide what aspects of their surroundings are resources

This principle is an important part of geography for several reasons. It helps explain why different cultures can create very different-looking landscapes in apparently similar environments. That, in turn, helps guard against a simple **determinism** that puts nature in charge of "determining" what human beings can do in a particular area. Awareness that other people might do different things with a given environment can help broaden the range of options that people might consider as they decide what to do with their own landscape. This broadening of perspective is one of the most important citizenship outcomes of geographic education. For that reason, it should be introduced early and reinforced often throughout elementary and secondary school.

Determinism --

idea that nature determines what people can do in a place

Legacies (relics) --
landscape features left by previous inhabitants of a place

The second principle is that previous activity in an area often leaves features (**legacies** or **relics**) that affect what future generations can do there. These features can have positive or negative influences. For example, a sturdy old factory building can be a good place for a new mall or office. On the other hand, a toxic chemical spill can contaminate a site and make it harder to use. A prior decision to build an airport in a specific place will have an effect on what kinds of things are built nearby -- small factories or office buildings, perhaps a hotel or two, but probably not a classical music recording studio! A geographic description of a place, therefore, should include an attempt to identify prior uses and their legacies. (You might hear this idea described by the term "sequent occupance," a well-known geographic theory that describes human occupation of an area as a sequence of phases, with relics of prior forms of use usually visible in the present landscape.)

Land division --
process of marking areas that "belong" or are controlled by particular groups or individuals

A third basic tenet of place analysis is the awareness that **land division** is an especially pervasive and influential human activity. Different groups of people divide land in different ways. The first effective division of land in an area, however, leaves long-lasting imprints that have a powerful influence on what future generations can do there. These imprints range from obvious to quite subtle.

Some of the imprints are big physical features, such as roads, fences, or irrigation canals. These are easy to map and fairly easy to evaluate in terms of their constraining effect on future land-use decisions (e.g., the Detroit street patterns in Figure 3H or the colonial railroads in Figure 3P).

Other imprints have legal or technological implications. For example, the Homestead Act allocated land in 160-acre parcels and required people to build houses on their own land. The result is a pattern of scattered houses and relatively small fields (by modern mechanized-farming standards). The goal of the Homestead Act was to promote orderly settlement, but its legacies include some rather costly impacts on the economies of farms and small towns. Many of these impacts are related to the burden of delivering mail, running electric lines, and providing other services to a population that is dispersed throughout a large area (Figure 4K).

Range --
distance people are willing to go to get goods or services

Other costs become apparent when we consider the effects of locating small towns at optimal distances for horse-and-buggy transportation from scattered farms. On average, small towns were located about six to eight miles apart in many Midwestern areas. That was because three or four miles was about the **range** of daily travel -- the distance farmers could go and return in one day. The invention of the automobile allowed farmers to travel farther in the same amount of time. This deprived many small towns of their former market function (as illustrated in Figure 4P).

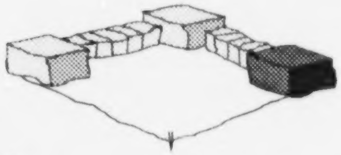
Abandoning houses and neighbors, however, seems to have a very high psychological cost. As a result, people in thousands of small towns spend millions of hours trying to convince stores, doctors, and factories to locate (or stay) in them. The goal is to provide jobs for people who otherwise would move away.

This book is not the place to debate rural development strategies. The ferocity of those debates, however (and of the parallel city/suburb debates about mass transit or housing policy), only serves to underscore the basic principle: *the first effective land division and the resulting arrangement of roads, city limits, and other landscape features can have profound impacts on what people can do in the future.*

It follows that we are unlikely to solve some rural and urban problems unless we understand both the present forces at work and the legacies of the past occupation of the area.

Here is a summary of the section on place: to understand the characteristics of a place, we have to know something about the resources there, the cultural definition of those resources, the previous uses of the land, and especially the method of land division. This is a tall order, and it is part of the reason why teachers must always seek to simplify the task by organizing place information into logical packages.

Better yet, give students the tools they need to perform such organization themselves. Fortunately, some of the same tools can be used for the third cornerstone idea, links between places.



Link

Link--

connection between places

As if the description and explanation of features within a place were not challenging enough, each location has another whole category of traits that depend on its connections with other locations. This cornerstone of geography has its focus on the analysis of ways in which locations are linked with each other.

"Natural" links between places

Some interactions between places are "natural," in that they occur without human thought or intervention. For example, air moves from high to low pressure, water flows downhill, and tectonic plates shift position. As a result, winds blow in predictable directions, rivers flow to the oceans, and mountains rise in some places while erosion wears the land down in other places.

Those natural movements, in turn, help create specific features in specific places: trees on windward slopes, deserts in rainshadow areas, earthquakes near plate boundaries, and so forth. In that way, understanding of links between places can help us understand the traits of the places. (Place and link are like another scissors, with blades that work better when used together -- recall Chapter 2?)

"Artificial" links between places

In addition to these natural links, many connections between places are created by humans as they move from one location to another, trade with people in other places, send messages to other people, and alter the natural flows of energy, water, or other materials. These **artificial links** include interpersonal ties among families, economic connections among corporations, and political links to governments.

As said before (maybe too often, but it is really important!), there is a tight back-and-forth relationship between the features in a specific place and the links between places. For this reason, the cornerstone idea of links can be explored in the same two ways as the features of a place:

1) by cataloguing landscape features that are caused by or otherwise related to the links -- river valleys, canals, railroads, repair shops, grain elevators, roads, gas stations, telephone wires, radio towers, and so forth,

2) by analyzing logical consequences of the most important links -- for example, the acid precipitation that occurs in New England as a result of winds moving polluted air eastward from factories in the Midwest, or the sudden growth of a formerly obscure town that found itself at the junction of two new Interstate highways.

Where did this come from?

One common way to introduce the idea of geographic links in a classroom is to inquire about the origins of familiar objects. For example, where does a pencil come from? The answer is often a surprisingly large number of places all around the world -- rubber from Malaysia, tin from Bolivia, wood from Texas, graphite from Ohio, paint from Delaware, etc. When the focus is on a more complex object, such as a modern automobile or a jet aircraft, the list of sources can be truly staggering (Figure 4L).

This complexity of origins lies at the root of an intriguing puzzle that has played a role in several recent political campaigns. The puzzle consists of trying to determine whether a Ford assembled in Mexico with parts from six countries is more "American" than a Toyota assembled in Kentucky with parts from nine countries and many states (see Figure 4Q).

The answer to that puzzle has implications for several aspects of American foreign policy. For this reason, geography teachers should give children some understanding of the basic patterns of world trade and corporate control. This understanding should include some awareness that the name of a company does not always reveal its product or its links to other places. Students in primary grades can begin by tabulating where their parents work and what is produced there. Intermediate students can profile local companies; secondary students can select an industry and describe its local and worldwide links. In each case, the goal is to see that the everyday lives of people in a place are often linked with what happens in other places.

Awareness of links between locations around the world is a useful learner outcome, but it is not the only goal of this part of geographic education. Citizens, directly or indirectly, have to make decisions about the amount and kind of **infrastructure** they want to have in a place in order to facilitate links between places. This infrastructure is usually expensive, and therefore the decisions can have a great deal of impact on the success of a community.

Infrastructure --

roads, railroads, storage buildings, water lines, sewers, television towers, and other features built to facilitate links between places

For example, the citizens of Philadelphia were facing a crisis in the 1830s. Their former position as the number-one city in the United States was under serious threat from a relative upstart, New York City.

To understand the nature of the threat, however, we have to look at the connections between the two cities and two key destinations: the "old countries" of Europe, and the new frontier in the middle of North America.

> On the European front, both Philadelphia and New York had good ports with sheltered harbors and deep water, but New York had a shorter route to the ocean. Both cities had some nearby waterfalls for power, but those in Philadelphia were closer to the center of the city. In short, the contest between the two cities was just about a draw so far.
>
> On the frontier side, however, things were dramatically different. New York had the good fortune of being located on the Hudson River. This river, and its main tributary, the Mohawk, flowed mostly through a broad valley of fairly weak rock. Building a canal in this valley was a daunting engineering task for the technology of the day, but it was not impossible.

Once completed, the Erie Canal soon proved its worth. The existence of an inexpensive route to the ocean made it possible for upstate New York farmers to produce grain for export. It is not at all surprising that a map of 1840 agricultural production shows a major grain-producing region along the Erie Canal (Figure 4M).

The flow of grain and other products down the Erie Canal and out through the port of New York had important side-effects. Traders moved to New York; financial institutions arose to serve the traders (why else would the New York Stock Exchange be there?) Population and wealth began to grow rapidly.

The mantra of geographically ignorant people -- it works there, so it should work here

Then the story gets messier. Pennsylvanians noticed that wealth and power were shifting to New York. Reciting what seems to be the mantra of the geographically ignorant, they said, in effect: "New York built a canal, and they're growing, so we ought to build a canal."

One glance at a map of mountains and rivers should be enough to show why this plan was questionable at best. The Pennsylvania canal followed the twisting Juniata River through dozens of rapids-filled gaps in the long ridges. Locks to get around those rapids added millions to the cost and days to the travel time. Then, when the canal reached the imposing cliff at the edge of the Cumberland Plateau, it could go no farther.

The Pennsylvanians could have seen the light and changed their plan, but instead they repeated another famous adage of the ignorant: "We've already invested so much in this, we ought to finish it." They proceeded to build an expensive system of cables and rails to drag the canal boats up the mountainside.

The entire enterprise had no real chance of competing successfully with the nearly level canal through New York. Philadelphia then had to face the next half century with two handicaps: a location that was less well linked to the expanding West, and a huge debt incurred by the attempt to build a canal link through unfavorable terrain (Figure 4N).

This kind of mis-investment in geographically inappropriate links continues to happen. Along the Atlantic and Gulf coasts, cities from Houston to Baltimore have recently invested in container port facilities, even though it was obvious that only a handful of such ports were needed. In the snowy north, Minneapolis and Saint Paul plan to build a rail-based mass-transit system. Proponents cite the success of such systems in Portland or San Diego, without noting the differences in climate, terrain, population density, and employment patterns.

The same kind of logic led planners in Moscow to build a system of multiple airports around the city, even though the population was neither large enough nor rich enough to use even one airport fully. And countries from Australia to Zambia are now making decisions about the kind of computer networks they should install to link their people together and with the rest of the world.

All of this concern about infrastructure stems from a basic fact: *the existing networks of roads, airports, fiber-optic cables, and so forth have a tremendous impact on the usability of specific sites.*

The effects can be either positive or negative. For example, a busy highway intersection is a good site for a gas station, whereas a new airport runway can be a disaster for a nearby outdoor motion-picture studio or opera-under-the-stars.

In sum, the study of ways in which places are linked to each other is one of the cornerstone ideas of geography. The study of links should be introduced early and reinforced frequently throughout a geography curriculum:

Ways of evaluating infrastructure:

student activities that deal with the effects of roads or other forms of infrastructure

> In primary grades, students can make travel diaries, trace historic journeys, or tabulate and map features that occur near Interstate highway exits (Figure 4O).
>
> In middle school, students can map commodity flows or use Census data to examine what happens to small towns that had good railroad or canal connections but were bypassed by the Interstate highways (Figure 4P).
>
> In high school, students can use the gravity model to predict traffic between specific places and thus evaluate places along the route as likely sites for convenience stores or outlet malls (remember Figures 3E and 3F?).

At all grade levels, students can look at historic events in terms of how they were influenced by geographic links among places. On an intercontinental scale, for example, places such as Gibraltar or Hormuz have strategic importance because they are **choke-points**, locations where traffic along a major route has to go through a narrow "funnel."

Choke-point --

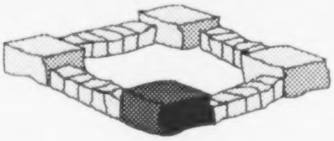
ocean strait, mountain pass, or other place where traffic has to go through a relatively narrow channel

In the case of Gibraltar, the nature of the choke-point has shifted several times in the past, depending on whether people at a given time thought a short crossing from Africa to Europe was more or less important than a water route between the Mediterranean Sea and the Atlantic Ocean (Figure 4Q).

We should not end this section on links without repeating that connections between places are not all human-made. Many places get their character from the natural links they have with other places. For example, note the tendency for smelly industries and low-income neighborhoods to be located on the east sides of American towns, because the prevailing winds blow from west to east in most parts of the United States (recall Figure 4G?).

Finally, to tie this section on links back to the previous one on places, we should repeat that the distinctive features we see in a place are often consequences of links with other places. For example, the traits of Subsidence areas are really consequences of an atmospheric link between the Equator and places about 2000 miles away. It is the persistent upward, poleward, and then downward movement of air that makes the Sahara so dry.

Indeed, if we want to trace the causal chain backward even farther, we could say that the dryness of the Sahara is really a consequence of the steady output of energy from the sun, 93 million miles away. The flow of energy toward a spherical earth initiates a sequence of air and water movements that create the climatic zones of the earth. Noting those global flows and the resulting local traits is a good way to summarize the ideas of link and place; it is also a good transition to the fourth cornerstone idea, *region*.



Region

To geographers, the word "region" serves the same function as the words "era" or "epoch" for historians: as a handy label for an imaginary division that helps us make sense of a complex world (in other words, it's a form of classification). Geographers draw a distinction between two major types of regions, which are directly related to the previously discussed ideas of place and link:

Formal region --

group of places with similar traits

1) A **formal region** is a group of places with similar features. For example, the Corn Belt is a region of similar farms. Likewise, Yasenevo is a region of tall apartment buildings in Moscow; and the Sahel is a region of dry winters, short grass, and cattle grazing in North Africa. As one textbook said: "When a fairly large number of people respond to fairly uniform conditions in fairly similar ways, the result is fairly homogeneous territory that we call a region."

There is a reason for using the word "fairly" four times in the previous sentence. No region is entirely homogeneous, because no two places are exactly alike. Nevertheless, some places are more similar than others, and making a map of generally similar places can make it easier to study them, compare them with other places, or identify the factors that seem to mark the edges of regions (Figure 4R).

Functional region --

group of places linked to each other

2) A **functional region** is a group of places that are linked together by the flow of something. For example, the Amazon Basin is linked by the flow of water toward the Atlantic Ocean. The Tokyo Transit Region is linked by a flow of commuters on underground trains. The Peruvian settlement region consists of several high valleys linked to lowland cities by traffic on major roads (Figure 4S).

Delimiting regions is really just a matter of comparison and classification. The key question is: what other places resemble this place or are linked to it? As you have already seen on numerous occasions, comparison of map patterns is one of the most powerful analytical tools in the geographer's toolbox.

Map comparison can help us communicate well-known relationships. For example, asking children to examine maps of rainfall and population in Africa can help underscore a basic geographic fact: people tend to have more options for livelihood in areas that have at least a moderate amount of rainfall. Most of the major cities, farming areas, and industrial centers are in the well-watered regions around the Zaire Basin, in West Africa, and along the northern and southern coasts of the continent (Figures 4T and 4U. One might also refer to Transparencies 4G-4J in order to trace some logical connections between the effects of sinking air and the patterns we see on regional maps of population and rainfall.)

This kind of map comparison cannot *prove* anything. It can, however, give us reason to reject erroneous ideas. One could not look at these maps of Africa, for example, and argue that desert climates are invigorating and help to promote population growth. If that were true, we would expect to find more people in the subsidence regions.

Exceptions are often as interesting as the generalizations formed by map comparison. In North Africa, the narrow ribbon of densely settled land along the Nile River is a striking exception to the rule of sparse population in the latitude of the Subsidence. Generations of schoolchildren have grown up with history books that describe ancient Egypt as "the Gift of the Nile." Comparing a precipitation map with a population map helps to show why that gift was so miraculous.

Map comparison has enormous practical value when applied in fields such as **epidemiology** (the study of human diseases). One well-known example involves another consequence of the same basic climatic patterns we have been using as a recurring example throughout this chapter.

Epidemiology -- the study of human diseases

That consequence is malaria, a serious human disease that is carried by mosquitos. Its relationship with climate is obvious, because mosquitos are more numerous in hot and wet climates.

Another disease, sickle-cell anemia, is found in the same areas, but it does not seem to have a direct link to climate. The similarity of map patterns, however, helped persuade researchers to investigate further. They discovered that genetic carriers of the sickle-cell trait had a degree of immunity from malaria. Sickle-cell anemia thus continues to occur in areas where it can help people survive the more serious disease, malaria (Figure 4V).

In a similar way, comparison of a map of landforms with a map of slave-holding plantations can help us refine our understanding of historical events in the United States. The regions of large plantations coincide almost perfectly with a few fairly small regions of fertile soil and level land (Figures 4W and 4X). As a result, the large political region known as the Confederacy actually consisted of a number of smaller and quite dissimilar economic and social **subregions**. The images of huge plantations and cotton fields that have been so popular with novel writers and television producers were typical in only a very small part of the South before the Civil War. That fact, in turn, helps us understand:

Subregion -- small distinctive area within a larger region

the patterns of military campaigns during the Civil War,

the difficulty of forming effective government during the Reconstruction after the War,

the pattern of investment in education, infrastructure, and industry in the early 20th century, and

some patterns on modern maps of variables such as income, education, and voting behavior.

One final example will help highlight both the advantages and the pitfalls of regional map comparison. This example involves a controversy that started when several radio talk-show hosts complained about high taxes and unnecessary welfare programs.

Different social scientists would take different approaches to study this topic. An economist might tabulate the proportions of taxes used for welfare. A sociologist might interview welfare recipients to see how long they stayed in the program. A demographer might examine the age and family status of welfare recipients.

A geographer could contribute to the discussion by using the ideas of place and region, as summarized in a few well-selected regional maps (such as Figures 4Y and 4Z).

These maps are not hard to make. Data come from the easy-to-get *Statistical Abstract of the United States*, and a middle-school student could easily make the maps. Even a casual observer can see that the maps are visually similar (there is a high degree of **map pattern correlation**). Nine of the twelve states in the high category on the map of unemployment payments are also in the top twelve states on the map of inventions. Twelve of the seventeen states in the lowest group on the inventions map are also in the bottom category for unemployment dollars.

Map pattern correlation -- degree to which high values on one map are in the same places as high values on another map

This high degree of map pattern correlation implies that it may be worthwhile to search for plausible connections between welfare programs and inventiveness.

One possibility is that inventive states tend to become rich enough to afford high welfare and unemployment payments. This, in turn, might stimulate a movement of poor people into those states. In time, the high taxes for welfare programs will drain the local economy and decrease its inventiveness and growth potential. To maintain their competitive edge (according to this theory), these states should try to reduce their unemployment payments.

Alternatively, perhaps a strong unemployment program helps to promote inventiveness and entrepreneurship. This idea is also plausible, because a wide variety of people -- not just inventors, but also janitors, truck drivers, repairers, and so forth -- may want to know whether the "safety net" is adequate, before they take a job with a new company that might not succeed. Thus (according to this theory), high taxes in order to provide good unemployment insurance are a necessary part of the foundation for inventiveness and economic growth.

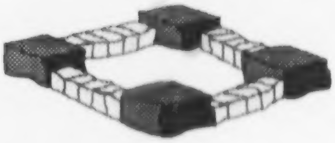
Clearly, these theories cannot both be correct. The comparison of regional maps tells us only that there may be a link between inventiveness and unemployment payments. It does not say what is cause and what is effect. One might continue the investigation by comparing maps of other factors, other places, and other times.

One fruitful avenue is to study the exceptions to the apparent rule. For example, look at the low-inventiveness states that rank higher on the unemployment-payment map. Do Alaska, Hawaii, Kansas, Maine, Nevada, West Virginia, and Wyoming have anything in common? Well, for one thing, you would have trouble finding many other states that are farther out of the transportation and communication mainstream. Is that fact important in trying to understand inventiveness? Maybe, but . . .

The purpose of this book is not to argue social policy. Even though the author does have some fairly strong opinions about inventiveness, it is more important right now to back away from that topic and to underscore the more general idea that map comparisons like these are surely relevant in an age of tightening budgets and rising concern about economic competitiveness.

For that reason, the summary statement is phrased in terms of the abstract concept of regionalization rather than the concrete topic of inventiveness: *The geographic theme of region is primarily of academic interest, in and of itself. It gets practical significance (and therefore a boost in "teachability") when we realize that comparison of regional maps can suggest relationships in the real world that might be worth investigating in order to solve real-world problems.*

(Of course, to do that efficiently,
people must have easy access to
a good stock of regional maps,
or be able to make them!)



Summary

Salt Lake City can provide a good concluding example for this chapter about cornerstone ideas. The relative *location* of the high Wasatch Mountains just to the east helps explain why a *place* in the Salt Lake Valley has the traits it does. The *movement* of water from the mountaintop to the valley is a natural link between these locations. The site of Salt Lake City was chosen by a group of people who saw the rivers as an important resource. The result is a small but important *region* of rivers, canals, irrigated fields, and cities, all situated in (surrounded by) a larger region of desert shrubs and few people.

Geographical irony --
how the very things that make a place good for some human purposes can also pose a threat for others

Salt Lake City is also a superb illustration of **geographical irony**. Repeated earthquakes along the Wasatch Fault built the mountains, which capture the snow that fills the rivers with water and thus makes the valley livable. Those earthquakes, however, can also pose a threat to houses, gas lines, water mains, and roads.

In short, precisely what makes a place good for some people or purposes can pose a threat for others. That is a recurring theme in geography (as noted by Ptolemy, Herodotus, Magellan, Lewis and Clark, and the authors of this book, about 30 pages ago!)

What are appropriate ways of presenting the core ideas that have been described in this chapter: location, place, site, cultural definition of resources, human-environment interactions, legacies of prior occupance, infrastructure, link, movement, region, determinism and free choice, and geographical irony?

This question is extremely important, because these ideas should be introduced in primary grades! The question is not: when should we present these ideas? Rather, the question is: what is the appropriate vocabulary for teaching these ideas at a given grade level?

The search for ways to present cornerstone ideas is what leads people to write scope-and-sequence outlines. Once we reach a consensus on what-to-teach, then teams of authors and teachers can start to figure out how-to-teach (and what-materials-are-needed-to-support-that). These materials-development efforts often begin with an attempt to translate ideas into language that is suitable for students at specific grade levels. That is the subject of the next chapter on pedagogical themes and standards.

5

FIVE THEMES OF GEOGRAPHY: MEETING THE STANDARDS

In 1984, a group of geographers met to decide how to describe the core ideas of geography for classroom teachers and administrators. One tangible result of their deliberation was a 28-page brochure entitled *Guidelines for Geographic Education: Elementary and Secondary Schools*. This document asserted that teachers could organize geography classes around five fundamental themes: location, place, relationships within places (interaction), relationships between places (movement), and region.

Origin of "the five themes"

Ten years later, this modest document had achieved the status of Scripture or the Koran among some educators. Conferences were being organized around the use of "the five themes" in geographic education. Teachers were being exhorted to design units on each of "the five themes." Textbooks were being written with "the five themes" as chapter titles or section headings. Courses were being approved or rejected on the basis of their use of "the five themes."

Much of that effort was hopelessly misplaced.

People were talking about themes, using theme language, and recommending ways to teach themes, without understanding what a theme really is. In doing so, they were producing materials and suggesting strategies that actually subvert the idea of theme-oriented pedagogy.

That misunderstanding is still evident in many discussions about implementing the National Geography Standards.

Let's talk about it, OK?

What is a pedagogical theme?

(Paragraphs adapted from Journal of Geography 1992)

To learn about the use of themes, it might be worthwhile to listen to some musicians. They have been using themes to organize their work for centuries. For example, listen to the third movement of Tchaikovsky's Sixth Symphony. After a rather long introduction, a clarinet plays a four-note phrase. This phrase is part of the theme of the movement, but we do not know it yet. It is just there, amid the swirling strings, tootling flutes, and percussive snaredrummery.

In the hands of a lone clarinet, the phrase is understated, barely audible. Then, after more orchestral diversion, the phrase comes back, now seven notes long and louder, more insistent. A while later, another instrument replays the first four notes, and then a small group repeats the longer phrase. This pattern continues, and the movement is almost half over before we hear the entire theme.

At that point, all of the previous hints get a deeper meaning. Tchaikovsky's strategy was to use fragments of the theme as portents, so that the theme itself would be all the more memorable when it finally arrives. The full statement of the theme, in turn, helps to tie the previous music together into a coherent unit.

What is the role of a theme?

to tie things together

That is precisely what a musical theme does: it holds a piece together and helps define what ideas are important. By analogy, *a pedagogical theme is something that pervades a class and helps hold it together by defining what images and ideas are important.*

The theme provides guidance about what kind of questions should be asked and what kind of answers are valid. But the theme is not necessarily announced as the topic for the day. Nor is it necessarily a prominent part of the discussion.

Note: I said "not necessarily;" which is not the same as "not." Beethoven bluntly stated the theme of his Fifth Symphony in the first four notes. Tchaikovsky often waited half a movement before releasing his theme. Dvorak liked to bring themes from previous movements together in the final movements of his symphonies. Bach and Shostakovich used the initials of their names as recurring themes in a number of compositions.

The use of themes is even more pervasive in musical cultures that do not make such a point of extolling "originality" and attaching individual composer's names to music. For example, the three-note "sakura" phrase pervades a whole genre of Japanese music. Particular rhythms denote specific dance steps in medieval and modern Spanish music. Guitar riffs are freely borrowed to acknowledge professional kinship among blues musicians.

One plausible conclusion is that the selection of ways to present a theme is a true choice, with many options. To be pedagogically effective, the selection of themes should done by the classroom teacher, not an administrator, board, or author.

The disciplinary use of themes

This chapter is not about "the five themes" of geography. It is about how to use themes in geographic education. Chapter 4 was actually about the five themes, though it used different words. A key point of both chapters is that themes are a key organizing tool for a teacher, but geography teachers do not all have to use the same words (or even the same number of categories).

In fact, the process of thinking about themes might be even more important than the actual list of themes. The list of cornerstone ideas in Chapter 4 has only four items, yet the four cornerstones and the five themes are almost identical in scope and intent.

The basic equivalence of the lists of themes and cornerstones is comforting. This is how things should be -- a discipline should strive for enough similarity of approach that outsiders can readily identify its members as part of a single team. This is best accomplished by lengthy discussion, the same messy process that helps any democratic group achieve consensus.

That is what happened when 350-odd people worked (in varying ways) for many months to draft the National Geography Standards (summarized in the Postscript to this chapter). The discussion brought a greater degree of consensus than before. The document itself, however, is long, redundant, and sometimes contradictory. I repeat: *it is the process of thinking about themes that matters, not the particular wording that a certain person or group favors.*

To avoid misunderstanding, therefore, let me underscore that the idea of Standards is exceedingly important for a discipline. That is why it is no accident that the cornerstones in the previous chapter of this book are essentially identical to "the five themes:"

Equivalence of themes and cornerstones

Both lists begin with the term "location," because we have to be able to express where something is before we can analyze it geographically.

"Place" and "site" are essentially similar concepts. They both focus on the complex mix of factors that occur together in a specific location. I mildly prefer "site" because it is a slightly less fuzzy term.

"Movement" and "link" are obviously related. One denotes the process of changing position, while the other includes the process, the conveyance, and the consequences of movement between places.

Finally, the concept of "region" has the same meaning and position in both lists. It helps bring the concepts of place and link (or movement) together.

Only the theme of "human-environment interaction" appears to have no equivalent in the cornerstone chapter.

That absence, however, is more apparent than real. As interpreted by many users, "the five themes" had four pithy one-word terms and one surpassingly awkward three-word phrase. The phrase is both grammatically and conceptually different from the other four terms. Moreover, the theme of "human-environment interaction" does not add anything that is not already included in the theme of place, since a place is defined as the sum of natural and human features as they interact in a specific location.

This admission raises an intriguing question: why do "the five themes" include this unwieldy term? In a nutshell, because geography exists in a world that has many academic disciplines, which all too often get embroiled in unseemly turf battles.

Why "the" five themes include the phrase "human-environment interactions"

The group who first proposed "the five themes" tried to draw a neat conceptual distinction between "relationships within places" and "relationships between places." Meanwhile, out in the real world of curriculum development, a major threat to the "domain" of geography seemed to come from people arguing for a separate environmental-studies course. At the same time, a formerly powerful coalition of historians, political scientists, and social-studies teachers was under fire from a mix of parents, legislators, and talk-show hosts. Geography advocates did not think it was necessary to define a "boundary" with social studies, but they apparently did see a need to "mark territory" against the environmental-studies "lobby." The result was a rewording of the third theme as "human-environment interaction." This term stayed in its strategic position in the middle of the list, even though it is both grammatically and conceptually different from the other four.

One purpose for writing this book is to help teachers and administrators devise strategies for implementing the National Geography Standards. With that goal in mind, I'd rather not make a big issue about "the proper home" for environmental studies.

For that reason, I feel fairly comfortable in quietly burying one of "the five themes" as they are now known. We really don't need it.

(See? Lightning didn't strike!)

For the record, then: human-environment interaction in a given location usually involves movement of several kinds, and the nature and results of the interaction are part of the essential character of the place. Indeed, human-environment interaction is precisely what defines a place as unique and worth studying.

In short, human-environment interaction is a kind of "super-theme" that sprawls across the other four themes (Figures 5A and 5B).

> CAVEAT: If parents or administrators in a given school want to see "human-environment interaction" in your outlines, by all means put it there. If they prefer the language of the National Standards, use that instead. The issue is far too important to fight about at this level. Well-conceived themes are crucial in geography teaching, but the actual wording of themes or standards is much less important than how they are used.

Within limits, use whatever terms your supervisors prefer; it's better to argue about the usage, not the terms

One healthy start would be to eliminate the capital letters, quotation marks, and hushed tones whenever we print or speak of the five themes. After all, it is not the theme that makes Tchaikovsky's Sixth Symphony memorable, it is how he used it.

Using themes in the classroom

It is much more important to use themes and standards properly, rather than to quibble about the exact wording.

On this score, geography has at best a mixed record. Far too many authors and publishers jumped onto the theme bandwagon without really thinking about the role of themes in a classroom. The result is a whole passel of books and lesson plans that use the language of the five themes in a shallow and self-defeating way. If history repeats itself (as it often does), we can expect to see the same thing with the new National Geography Standards, unless we pause for a moment and think about the role of themes.

So, how should themes and standards be used? In two words, *inductively* and *cooperatively.*

Why use themes inductively? The purpose of a theme is to hold a lesson together and keep it consistent with the rest of the course. The theme is a subliminal thing that permeates a course and gives it coherence. The actual content of a given lesson, however, may not even mention the theme. The most durable learning is that which occurs when an idea seems so compelling that students grab hold of it and use it as if they thought of it themselves.

inductive learning --

looking at cases and then drawing a conclusion

In this view, teaching is nothing more (or less!) than a conscious effort to structure experiences so that desired themes emerge out of guided manipulation of realistic data in compelling situations.

That kind of "Aha" is hard enough to set up in any circumstance. It is almost impossible to achieve when the theme for the day is announced at the beginning of the unit (or, worse, is used as a title for a section of the textbook).

In short, *rote announcing of themes as lesson topics or chapter headings implies that learning consists of rote memorization of ideas. That is seldom effective pedagogy.*

(A theory about why theme-labelled pedagogy is so often encouraged)

(So why is theme-labeled pedagogy so frequently advocated? Here is a theory -- speakers on the lecture circuit can get away with it. They arrive on the scene with considerable fanfare. They dispense their ideas to an audience that is entranced by a new and fresh face, and they leave before they wear out their welcome. I've done it myself, dozens of times, and it feels good.

The problem emerges whenever a lecturer walks away convinced that what works as a one-shot deal would also work on a day-to-day basis. Classroom teachers have a different task. They have to come up with creative ways to maintain student attention for 180 days, more or less. That demands a more thoughtful approach than simply announcing a theme and then doing a lesson about it.)

Dealing with themes one at a time is like using only one blade of a scissors

(recall Chapter 2?)

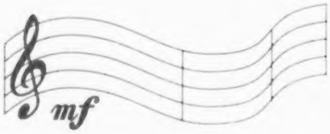
Why use themes cooperatively? Because using them in isolation is like taking the scissors apart. Geographical themes usually work better when they work together:

- analyzing movement helps us understand place;
- measuring distance between locations can clarify the pattern of movement;
- drawing regional maps helps us compare places and predict movements; and so on.

Using themes as lesson or book-chapter titles tends to constrain this interplay between themes, and that, in turn, actually makes it harder to learn about places and how they are connected.

This point does not need belaboring here, because it has been built into this book all along. Chapter 2 talked about cooperative use of thematic and reference perspectives. Chapter 3 dealt with a simultaneous focus on multiple strands of meaning. Chapter 4 showed how the key ideas of location, place, link, and region interact. Thus, when Chapter 5 says that the themes of geography work best when used together, it can point to three previous chapters that did precisely that.

(*P.S. And wait til you see Chapter 9!*)



Teaching without themes?

If teaching with themes is so complicated, why do it? Because someone who tries to teach a subject as complex as geography without a strong set of organizing themes can hardly avoid falling into one of two deep traps:

Pitfalls of themeless pedagogy

over-generalization -- proceeding "upward" from one broad generalization to an even broader one as you try to build a logical view of the entire world, and

trivia-listing -- compiling ever-more-complete lists of facts about places as you try not to omit any part of the truth.

These deep traps are the context for two fairly strong prescriptions:

Prescriptions for theme-driven pedagogy

Do not use themes as chapter or unit titles. That puts cart before horse and usually makes teaching less effective. It might work for a well-publicized one-shot speech or a short workshop, but not for a full year.

By all means use themes. Keep them in mind as you select topics, photos, data, basemaps, discussion questions, and evaluation instruments. In other words, let themes guide decisions about every aspect of the course.

In short, themes are extremely important in instruction.

That is why the current bumper crop of shallow "theme-oriented" books, lesson plans, and course outlines (in geography, history, science, and many other disciplines) is so deeply discouraging, disgusting, disheartening, dismaying, and distasteful (to use just a few words that popped out of what is apparently a long and well-alphabetized list in my mind).

OK, I may be over-reacting a bit. Like most committed teachers, I despise cheap pedagogical rip-offs. Alas, many hastily-written but well-marketed books based on "the national standards" or "the key themes" in various disciplines will be just that. To keep overworked school boards and administrators from blindly adopting those apparently "on-target" books, teachers have to articulate how they want to teach geographical themes.

That involves knowing about the politics of educational reform and the phrasing of educational objectives and standards, which are the topics of the next two chapters.

Postscript: National Geography Standards, grades K-12

(*Geography for Life*: National Geographic Society, 1994)

18 Goals
in 6 Groups

For each of 3 grade levels, the Standards document suggests an organizational framework with 6 broad groups of goal-statements and dozens of specific illustrations. The 18 goal-statements in the framework are paraphrased below. According to the Standards, a geographically informed citizen knows:

The World in
Spatial Terms

1) how to use maps and other geographic representations to interpret the world and to analyze world events
2) how to use mental maps to organize information
3) how to analyze spatial organization and spatial interaction, and how to use those ideas in making locational decisions

Places and
Regions

4) about the physical and human characteristics of places
5) that people create regions of various types to simplify and thus help interpret the Earth's complexity
6) how culture and experience influence people's perception of places and regions

Physical
Systems

7) physical processes, patterns, and cycles that shape the surface of the Earth
8) characteristics and spatial distributions of ecosystems, their productivity and diversity

Human
Systems

9) characteristics, distribution, and migration of population, impacts of migration on physical and human systems
10) characteristics of cultural mosaics, how cultures change, how cultures influence regional characteristics, how technology affects standard of living
11) patterns and networks of economic interdependence, how people earn a living, issues in local and global economy
12) patterns and functions of human settlement, locations and internal structure of cities, causes of change in settlements
13) forces of conflict or cooperation, how spaces are divided, how external forces can conflict with internal interests

Environment
and Society

14) how human actions modify the physical environment, how societies can devise solutions for environmental change
15) how physical systems affect human systems, and how perceptions of natural hazards affect responses to them
16) changes in meaning and use of resources, policy related to the use of resources, how resources can be recycled

Uses of
Geography

17) how to apply geography to interpret the past, how geographic processes affected history
18) how to apply geography to interpret the present and plan for the future, to solve problems and make decisions

6

A FOUR-WHEELED CART: RESISTANCE TO EDUCATIONAL CHANGE

(Paragraphs adapted from Journal of Geography 1996)

At the scale of a society, education is like a factory -- students enter at one end and emerge at the other, changed and (we hope) improved by the experience. At the scale of a single discipline such as geography, however, it may be better to view the educational enterprise as a cart with four wheels (Figure 6A):

1) pre-service training. Teaching is both a craft and an art. Learning to teach, therefore, has much in common with the ancient **guild** model of master and apprentices. In effect, teachers often start by teaching what (and how) they are taught. If they experience no geography in their teacher-training, how can they see its role or value?

guild --

medieval organization in which apprentices work for a master until they learn enough to be accepted as full members of the guild

2) in-service training. Only five or six percent of the teacher force is replaced each year. This has two implications for the timely implementation of new National (and state) Geography Standards. First, some present teachers may be asked to teach geography, even though they have no prior training in the field. Second, some new teachers must try to maintain interest in (and find support for) a subject that few of their colleagues understand.

3) curricular position. Each discipline needs a time-slot in the curriculum. This time-slot is the mechanism that specifies how many hours should be devoted to a given subject at each grade level. Alas, geography teachers (like many others) have to negotiate for position in the curriculum. There are many demands for time. Moreover, course proposals may be judged by people who have little background in geography and may not see how the subject (as they understand it) has relevance to the real world of jobs, crime, and health.

4) teaching materials. Students need to work with maps, data, field observations, and other geographic content in order to learn geography. The list of useful teaching aids includes books, student activities, displays, A/V materials, computer software, as well as resource people and field guides. Most teachers have too many demands on their time to be able to create all the materials that are needed for effective geographic instruction.

Note: the cart analogy does not put any of these four groups -- education departments, teachers, administrators, or authors -- in the driver's seat. Students are the ones who are being carried toward a goal of understanding. The four listed groups are the carriers. Parents may also be viewed as an essential component of the system, but they are more like fuel or drivers than wheels.

The pedagogical cart needs all four wheels:

- *pre-service training*
- *in-service training*
- *place in curriculum*
- *teaching materials*

The value of the cart analogy lies in the realization that a pedagogical cart needs all four wheels to run. This gives people who dislike change (or fear it) a powerful weapon to delay or block action. When asked for assistance with any of the four activities, they can point to the relative flatness of other tires:

Ask a publisher to print a high-school geography book. A likely response is that the market is too small because the subject is not required in very many states (i.e. the subject has no time slot).

Ask an administrator to put a geography course in the curriculum. A likely response is that the proposal is impractical because few teachers are trained to teach this kind of course.

Ask an education department to offer courses in geographic education. A likely response is that there is no need because there are few jobs for geography teachers.

Ask an in-service teacher to attend a geography institute. A likely response is that such an institute is not really necessary because their school does not offer such a course. (Moreover, there are no good new textbooks or materials to use in proposing one. etc.)

All of these responses have the same basic message: one can postpone pumping on any given wheel, because the other tires are flat and the cart will not run anyway. This has two implications. One is obvious and important, and one is less obvious but perhaps even more important.

The first implication is that people can (and often do) choose to do other things rather than trying to pump up a flat tire on the cart of American geographic education. Teachers, administrators, and authors all have plenty of demands on their time. Pumping on the tires of the geography cart has been an unrewarding task for many years. One obvious result is that the cart does not run very well. Poll after poll has shown that American students have a level of geographic awareness that is internationally embarrassing.

This finally reached the point where it caught the attention of governors, senators, and presidents. Geographers now have a unique chance to make their case in a national forum. They have been given this chance partly as a result of the efforts of a handful of zealous proponents, and partly as a result of public reaction to some polls that revealed huge deficiencies in the geographic understanding of typical American citizens.

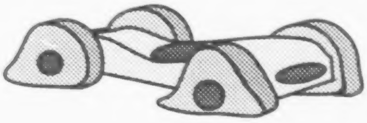
That brings us to the second implication of the four-wheel cart analogy. People who are pumping on individual tires are now being asked, far too often, to redirect their attention to the other wheels. Organizers of summer institutes have been asked to write books of materials. Authors have been asked to conduct teacher-training workshops. In-service teachers have been asked to formulate learner outcomes and create course proposals.

This redirection of effort is useful, perhaps even essential, if done in moderation. Authors who occasionally work with teachers are less likely to churn out materials that teachers cannot use. Institute organizers who develop some of their own materials gain an appreciation for the challenges involved in producing books and activities for a wide spectrum of users. And teachers who write materials and teach them to each other almost always wind up broadened and recharged by the experience.

Some familiarity with all four wheels is beneficial,

The redirection of effort is harmful, however, if carried past a modest level. The pernicious logic of pointing at other tires and calling them flatter-than-this-one has pushed many competent and dedicated people into roles where they are less effective. The results often are unsatisfactory performance and accelerated burnout. At the extreme, some people are so busy running from one tire to another that they do not have enough time or energy to maintain a high level of competence at any one task.

but too much running from one wheel to another is self-defeating



A better goal, and how we get there

Here is a scenario: an author has just finished a presentation about a classroom activity. During the question-and-answer period, half a dozen people ask questions about teacher training and curriculum reform: "What are you doing to help retrain history and social-studies teachers to use these materials? What are you doing to present this material to education majors in college? What steps are you taking to get geography listed in the state curriculum?"

These are all valid concerns, but is a textbook author necessarily the one to respond to them? If the questioners persist, and the speaker tries to answer, the result is likely to be unsatisfactory answers, followed by general commiseration about the sad state of education in America today. This is hardly a desirable goal.

Should we focus on questions we are not qualified to answer?

How can this scenario move toward a different conclusion? One good start would be to acknowledge that good authors are experts in writing. They are there to answer questions about written materials. If no one asks that kind of question, their expertise is wasted and the discussion heads into areas where no one is expert.

or on those we can?

So, here is the same scenario, with a twist. The twist is that the author or moderator has a copy of the cart diagram (or a similar analogy). It is poised at the podium, ready to be brought out if anyone asks about anything except the classroom materials that were demonstrated.

If someone asks what the author is doing to train teachers or convince administrators, the proper answer (in this scenario!) is, "nothing. I don't need to. There are good promoters, institute organizers, and pre-service instructors who are pumping their tires as fast as they can. I am just trying to keep the materials corner of the cart up to their level."

If we can focus our best pumpers on the tires they know best, geography will do well. The four tires will get pumped up, more or less simultaneously. American students will have adequate time to work with good materials under the guidance of well-trained teachers. They will have a chance to learn the kind of geography that is useful for life.

> At a local scale, students (future citizens, etc.) will learn how to arrange roads, cities, fields, clinics, and other things so that they are fair, safe, efficient, and beautiful.
>
> At a global scale, students will learn about similarities and differences in climate, culture, and competitiveness.
>
> And when we put the two scales together (like the two blades of a scissors!), the sum is more than the parts: fair, safe, efficient, and beautiful places tend also to be culturally tolerant, residentially desirable, and economically competitive.

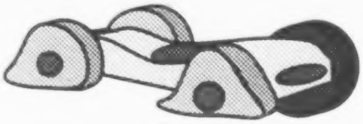
The geographical scissors --

local and global, working together

(see chapter 2)

We will not reach that goal if we let tire-pointers turn successful institute organizers into mediocre book authors, good pre-service teachers into frustrated curriculum advocates, and effective disciplinary spokespersons into beleaguered summer-institute administrators. When questions about the other tires come up, turn them back to the asker. If you are pumping effectively on one tire and some people ask why you aren't working on another, tell them that you're doing your job and others are doing theirs.

The rest of this chapter is a brief outline of some ongoing efforts at each wheel of the cart. The order of presentation is immaterial; we arranged the four tires in rough chronological order for someone who studied to be a teacher, began a teaching career, served on a curriculum board, and then helped write a student workbook.



Pre-service training

Pre-service training should begin with two subtly but profoundly different questions:

> What does someone need to get a teaching job?
>
> What does someone need to do a good job of teaching?

The answers to these questions should guide students in all phases of pre-service training: choosing courses, developing skills, and deciding what published materials to buy and what classroom materials to save.

So, what does someone need to get a teaching job? Here is the standard platitude: getting a teaching job involves putting together a resume that demonstrates aim, breadth, coherence, depth, and flexibility. This book is not the right place to do much more than repeat that platitude; the other parts of a pre-service curriculum are there to help formulate an answer.

To get
a job interview,
you should have
a persuasive resume

This book can, however, provide some assistance in answering the second question: What does someone need to do a good job of teaching geography? We could start by acknowledging that the four tires of the geographic cart are probably going to be out of balance for the foreseeable future. To some extent, therefore, prospective teachers will have to be able to train themselves, justify their courses to administrators, and make some of their own classroom materials.

Administrators realize this: they search a prospective teacher's resume for evidence that the person has these skills. Making a coherent and attractive set of your own geography units from locally available materials is one way to assemble a portfolio that can help demonstrate all of these skills.

The value of a teaching portfolio

Making a high-quality teaching unit shows depth of understanding of specific topics and breadth of knowledge about the field. It is a way to display your mastery of the skills of page layout, graphics, and media. It can demonstrate awareness of methods and topics that fit the National Standards and other pedagogical initiatives. And it can demonstrate flexibility in acquiring and using new knowledge and skills.

In short, a pre-service teacher trainee should treat each class project as an opportunity to add to a personal portfolio, because that kind of portfolio is a persuasive way to show potential employers that you are a good candidate for the job.

Locally available sources of geographical information

Possible sources of raw data for these lessons include:

- telephone yellow pages, which list the addresses of a wide variety of human activities that can be mapped and analyzed (Figure 6B);

- almanacs and census reports, which provide statistical data and descriptions of towns, counties, states, and countries (Figures 6C and 6D);

- topographic maps, which provide detailed reference maps that can be made into teachable ideas by someone who knows how to analyze as well as look at the maps (Figures 6E and 6F);

- soil surveys, which have detailed maps that can be made into simpler maps to show the suitability of various sites for uses such as farming, building, wildlife, or recreation (Figure 6G);

- newspapers and magazines, which provide descriptions of current events and places that can serve as illustrations of topical principles, theories, or generalizations (Figure 6H);

- environmental impact statements or planning documents for local projects, which (by law!) are supposed to make public the kind of information that would allow an informed citizenry to make decisions about whether the benefits of a proposed project exceed its costs;

- road maps, , letters from relatives, tourist brochures, Chamber of Commerce profiles, and other sources of information about places of interest (Figure 6I);

- and, of course, badly designed units in existing textbooks, which can always be improved!

The key is to assemble these items into teaching units that feature all of the ideas already described as key components of geographic education:

Criteria for evaluating teaching units

1) a spatial perspective (chapter 1),

2) an interplay of both local and global or national scales (the two blades of the analytical scissors of geography, as described in Chapter 2),

3) a carefully stirred mix of concrete images, abstract theories, and value judgments (the three strands of meaning, as described in Chapter 3),

4) the preparation and analysis of regional maps that show the traits of specific locations and their links to other locations (the four cornerstones of Chapter 4)

5) all organized around a number of themes or standards that will certify the student as having mastered the key ideas of geography (chapter 5).

That is a tall order, but it is why geography teaching is both important and challenging.

In-service training

Once hired, a geography teacher has to figure out ways to keep abreast of a changing world. That is another tall order, especially in light of typical constraints on time and money.

One possibility is to make efficient use of reading, TV-watching, travel, and recreation. In the interests of space, let me focus on just one of those. Here are a few handy rules of thumb for geographically efficient travel:

Rules of thumb for geographically efficient travel

> Take copious notes, if for no other reason than because they help you justify your income-tax deduction for some of the costs of the trip. (A geography teacher who fails to deduct some of the costs of travel is missing a real benefit of the occupation.) Look for examples of features that you can describe to your students in an interesting way and that also illustrate an important geographical point (see the end of chapter 9 for an example).

Take photographs and record their locations. You may not use your own photos in class, but they will aid your memory of places you have visited. I find it interesting to compare my photos of a famous place with what is in magazines and tourist leaflets; without my own photos, I suspect my memories would gradually shift toward that public-relations image of the place. In the same vein, retaking photos from the same places on a later trip can give a very valuable time perspective. (See Table 3-1 for more ideas about photography).

"Adopting"
a few places
for repeated study
is more rewarding
than skimming
many places

"Adopt" a few places and visit them repeatedly. You cannot cover the world -- pick a few places and get to know them well. Choices can have different rationales. For example, I adopted Magnolia, Mississippi, because its name was mnemonically Dixie. My wife's relatives lived near the Platte River, which is both historically important and hydrologically similar to other Great Plains rivers. In 20 years, I have visited Magnolia half a dozen times; I subscribe to its paper for a few months every few years. I have never travelled a sizeable length of the Platte on any one trip, but I have often crossed or followed parts of it. Occasionally, I stop and talk to someone along the river (or pick up some information from a county office or a town Chamber of Commerce). In time, this apparently casual strategy has resulted in quite a collection of clippings, stories, and brochures. In short, Magnolia and the Platte are now my benchmarks against which I can judge anything I read about the South, the Great Plains, water resources, race relations, and many other topics. I am sure that an equivalent amount of time spent reading or visiting a wide range of places would not be nearly as valuable in the long run.

Analyze something
in a geographically
systematic way

it is important
both for the
knowledge you get
and the "body-language"
you convey

Pick one thing to analyze systematically wherever you travel. For example, I check the price of adjustable pliers in hardware stores. I know, from personal observation, that five-inch Vise-grips range in price from $6.49 in a Wisconsin farm supply store to $12.95 in a small-town Alabama hardware store, and their price does not go up as fast as inflation. Likewise, I have observed a Mississippi supermarket had only one kind of mustard while a gourmet shop in Bethesda, Maryland, had 86. Personal observations such as these have a ring of authenticity. They afford a benchmark for evaluating newspapers, TV, and magazines -- my "maps" of pliers and mustard are related to national patterns of jobs and money, but the real world is more cluttered than the simple maps of the mass media. In this way, a self-imposed routine of systematic observation helps keep a teacher aware of both the orderliness and the messiness of the real world. And (this is very important!) it sends a subliminal message that systematic observations have more analytical value than anecdotes (that message is one students desperately need to hear in this age of sound bites, talk-show experts, and MTV-style editing).

Make sketch-maps of interesting data you find. Students learn, by example, that trying to see how things fit together in an area is important. Over the years, I have made sketch maps of big truck stops, well-maintained houses in historic districts, birdsfoot trefoil plants in a pasture, and many other topics (not all equally fruitful!) I continue doing this, because some of the most intriguing geographic ideas emerge from comparisons of serendipitous maps with traditional ones (Figure 6J).

Check what magazines are for sale in service stations in different places. Buy a local newspaper or a "strange" magazine every once in awhile and scan it. You can get interesting perspective (and sometimes mappable data) from magazines as diverse as the *American Rifleman, Bride, Country Living, The Economist, Farm Journal, Mother Jones, Paris Match, Sunset, Texas Monthly, Utne Reader,* or the *Washington Post* (to name just a few in alphabetical order). The content of a local newspaper or specialized magazine is especially useful because it is not distilled through a national editor. Good regional novels or movies are also helpful -- for a great blend of intriguing mystery and good geography, read a novel by James Lee Burke, Carl Hiaasen, Tony Hillerman, Sara Paretsky, Martin Cruz-Smith, or Margaret Truman (this list is hardly exhaustive!)

All of the items on this list grow out of a single basic idea. *Disciplined observation does not really take much more time than mindless travel, but it has plenty of tangible benefits.*

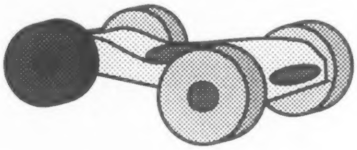
Two other ongoing strategies are worth mentioning. First, use the manuals to teach yourself a new geography software program every year or two. That may sound like a chore, but students are teaching themselves to use technology. Doing the same has two plausible benefits: empathy on your part, and respect on theirs (in addition to being able to use a computer as a tool).

Second, take an occasional refresher course. (I have to say that, since I'm a college teacher! But, frankly, this is an area in which I'd sincerely like to ensure my own obsolescence. If you have to skimp on any part of this list, a formal course is perhaps the least valuable item. I think teachers would learn more geography in the long run by forcing themselves to photograph barns or stores in different regions, record the locations of the photos, speculate about why they look that way, and read an occasional regional novel to get the perspective of someone who knows the area.)

A course, yes, but not in lieu of your own disciplined observation

We probably should not leave the topic of in-service teacher training without noting, once again, that geography is profoundly interdisciplinary. For that reason, it is worthwhile to pay attention to what is happening in related disciplines such as earth science, ecology, economics, history, political science, social studies, even mathematics and English. Take a course, sign up for a weekend institute, or scan a textbook every once in awhile.

Occasional forays into other fields can yield a huge increase in understanding with only a modest input of time. One big payoff comes when you have to work with people from other disciplines on a joint project. Knowledge of some corner of their domain can be very helpful in smoothing relationships and in finding ways to illustrate geographical themes with examples that have value in teaching other subjects.



Curricular position and the national standards

The key questions that should be asked by someone standing in front of this third wheel of the cart are: How many hours should be devoted to this topic? at what grade level?

People have been writing scope-and-sequence outlines at least since the times of Socrates and Sun Tzu. The aim is to record what a particular generation thinks is important to pass on to the next generation.

Over the years, this outline-writing activity has stimulated an endless cycle of numbingly repetitive debates about theory vs. practice, fascism vs. freedom, ethnocentrism vs. tolerance, and challenge vs. elitism. These debates are very important. Every teacher should come to reasoned conclusions about these issues. But they need not dominate every discussion about curriculum.

The Standards Project involved more than 3 years of work by more than 350 people (including the author)

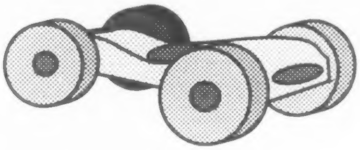
In this book, we simply accept the fact that a very large group of dedicated people worked together for several years to forge a consensus about what kind of geography should be taught. Whether I agree with every aspect of the National Geography Standards is immaterial. What matters is whether I can interpret them well enough to judge whether a particular set of teaching materials is faithful to the goals of the Standards.

Here, it is worthwhile to note that at least 20 states have embarked on their own standards-writing activity. The National Standards are laudable goals, but they are emphatically not to be used as outlines for classes or teaching units. In that respect, they are just like the five GENIP themes -- *they work best when they quietly pervade a curriculum rather than dictate its scope and sequence.*

Themes and standards should pervade, not dictate

The difference between a curriculum pervader and a curriculum dictator is subtle but profound. Geography classes and units that teach the Standards in a rote way will be inefficient, boring, and self-defeating, because the human brain simply does not learn well in such a prescriptive way. (If you don't believe that, try reading the Standards from cover to cover in one sitting!)

On the other hand, geography classes and units that ignore the Standards can hardly be said to be a part of the *discipline* of geography. The middle ground is to read the Standards (a little at a time!), keep them in mind, and then design class outlines and materials to meet them in a pedagogically effective way. For a teacher, the aim is to be able to select materials and use them in a way that meets the Standards. One fascinating clue comes from a simple examination of the available teaching materials (especially in some other disciplines as well as geography).



Teaching materials

High-school history basal texts have caught a serious (if not fatal) disease called OK-but-itis (technically, the name of the disease is this-book-is-OK-but-it-doesn't-say-anything-about-topic-X-and-it-would-be-better-if-they-added-just-a-little-bit-about-that-itis).

OK-but-itis --

a disease that leads inexorably to textbook obesity

Here is how the disease progresses. An author starts by writing 300 or 400 pages of coherent and fairly interesting prose. Then three dozen reviewers and editors get the manuscript. One by one they notice a few things missing, and they add a sentence here and a paragraph there. Then some state and local school boards review the book and make their own suggestions. No big deal, they all say, but the seemingly inevitable result is a massive tome of 900 or 1100 or even 1500 pages, which few students can read, not to mention comprehend.

Geography is genetically susceptible to the same disease, because it resembles history in that it takes the entire world as its subject. It pays, therefore, to be able to recognize the early symptoms of OK-but-itis, because the later stages almost always include massive boredom and alienation on the part of students.

A text cannot be "the expert" and still be concise and interesting

Let us start by recognizing (shouting would be better) that *the textbook does not have to cover every important topic.* Geographical themes can be taught with a wide variety of supplementary materials. The list of sources described above (under Pre-Service Training) is a good starting point.

If your library or media-resources person asks for suggestions for materials purchase, you might consider nominating the following (italicized titles and/or trademarks are chosen for illustrative purposes only; see Appendix for a much wider selection):

- Several thematic atlases at different scales. Affordable and effective examples might include *Goode's World Atlas* (Rand McNally), the *Historical Atlas of the United States* (National Geographic Society), and the state Atlas and county Soil Survey for your locality (if available).

Other sources of information for a specific class topic.

- *County and City Data Book, State and Metro Area Data Book*, and the *Statistical Abstract of the United States* (all from the Superintendent of Documents, and also available in computer-readable form).

- *United Nations Statistical Yearbook, Statesman's Yearbook*, other world almanacs.

- A data-set computer program such as *PCWorld, PCGlobe*, or the *World Atlas*.

- A route-finding computer program such as *Automap, EasyMap*, or *DeLorme Map'n'Go*.

- classroom access to an on-line system with a good browser.

With these reference works as one blade of a data-analysis scissors, teachers can bring in topical ideas from newspapers or television and ask students to search the atlases and other data for context, background, and perspective.

In short, a good set of reference books can serve as half of the foundation for a whole variety of investigations -- the other part of the foundation is a teacher's insight into what questions are geographically interesting. A good test of candidate questions is to ask if they include global and local scales of analysis (Chapter 2), deal with all three strands of meaning (Chapter 3), and build on the four cornerstone ideas of geography (Chapter 4). Those are precisely the kinds of questions that have been painstakingly developed in the National Geography Standards.

Assessing how well students master the use of geographical tools to analyze real-world data is the next step. That is the topic of the next chapter.

7

THREE KINDS OF TESTS FOR THREE KINDS OF MEANING

"Is this going to be on the test?"

That might be the single most frequently asked question in American classrooms.

Geography is more vulnerable than most other disciplines to that kind of "test mentality." By its very nature, geography lends itself to factual questions:

> "Where is the source of the Big Muddy River?"
>
> "What is the population of Central City?"
>
> "What is the elevation of the highest peak in Westland?"

Geographical trivia

In the United States, this kind of question has been attached to the word "geography" by several National polls, television quiz shows, computer programs, and a popular parlor game called Trivial Pursuit.

as opposed to

a multi-stranded geography

The kind of geography this book is about, however, is a much richer and more varied language, with analytical skills, explanatory theories, and evaluative opinions as well as concrete facts about places. The specific features in particular places gain meaning through their relationships to each other and with other places. To learn this kind of complex language, a student must deal with concrete images, abstract theories, and value judgments at the same time (as discussed in chapter 3).

Educators in many disciplines have long acknowledged the existence of qualitatively different kinds of learning. Various people have devised **taxonomies** of learner outcomes to categorize these different kinds of learning. Of these, perhaps the one by Bloom is still the most frequently cited.

Taxonomy --

set of terms used to classify

Taxonomies help teachers write objectives and design tests

These taxonomies are especially important at the two polar ends of the pedagogical process:

- in formulating objectives and goals prior to instruction
- in evaluating student performance after instruction

Those two phrases use the word "instruction" broadly, to include all kinds of teacher-guided in-class and out-of-class learning activities. The selection of a specific mode of instruction depends on the objectives, the background and aptitude of the students, and the skill of the teacher. Some kinds of facts, skills, and ideas are easier to teach with particular pedagogical methods. The decision is like choosing a specific tool to perform a specific task. To choose tools wisely, one has to know what outcome is sought.

Writing behavioral objectives and learner outcomes.

If they are so important, why didn't we talk about writing course or class objectives sooner in this book? Because, to be honest, I am not sure it makes much sense to talk in purely abstract terms about the process of objective-writing. On the contrary, it seems plausible that a teacher has to have a fairly thorough grasp of the scope and philosophy of a subject before the process of writing objectives can be more than rote memorization of a model. As with so many other topics, inductive learning about teaching may well produces a more permanent result -- first-hand experience with a wide variety of examples usually builds to a more solid conclusion about what is important. (If I am wrong about this, feel free to read this chapter first and then go back and read or re-read the others!)

In contemplating the task of writing objectives for a geography class, one observation that seems hard to avoid is that geography is a big sprawling subject. It is simply not possible to "cover" the whole world, and therefore teachers need clear objectives in order to decide what parts of the complex world to present to their students.

Those objectives should span the entire range of learner outcomes. At one extreme are the basic grammatical details of map language (e.g., what symbols are conventionally used for a map of house types or storm probability?) Other strands include widely accepted geographic theories as well as some controversial opinions about spatial equity (e.g., is the geographic arrangement of medical clinics in this area fair to all the people there?)

In writing objectives, therefore, a geography teacher has a mandate to decide what items should be included on four separate lists:

What locations are important?

1) What placenames should be learned? What specific countries, cities, mountains, rivers, borders, and other features are so important that they should be included in the material to be presented and evaluated?

What images or other features of specific places are important?

2) What traits of places should be learned? What specific lists of crops, landforms, religious denominations, house types, soils, clothing styles, factories, and so forth should be associated with specific places, *and at what scale*? The inclusion of scale is important to avoid the trap of vague objectives, such as: "the learner should be familiar with the pattern of natural vegetation in the United States." The problem with that statement is that the word "pattern" is far too vague. It is much better to say "the learner should be able to say whether the plant cover of a specified Iowa-sized part of any state is mostly broadleaf forest, needleleaf forest, grassland, desert, or chaparral." That degree of specificity is precisely what is needed in order to make an intelligent selection of modes of presentation and of evaluation. Any less detail only postpones tough decisions to the night before class or the day you make up the test.

What geographic theories are important?

3) What geographic theories should be learned? What specific list of explanatory ideas should students learn well enough that they can apply them to new data? At what level of precision should the theories be applied? Unlike the foregoing lists, which may contain hundreds of items, this list will probably have no more than a dozen theories. The authors of the National Geography Standards spent thousands of hours refining their lists, so that the result is a manageable number of important ideas. Good textbooks and workbooks should also have a clear way of identifying and summarizing key theories.

What evaluative criteria should students use?

4) What evaluative criteria should students use to judge features in a place? What measures of safety, fairness, efficiency, or beauty should students be encouraged to apply to the sensory images and geographic patterns they encounter in different places? This is obviously a very sensitive area; but if we are not interested in seeing our students learn how to select values knowledgeably, why are we teaching? Writing down a specific list of evaluation issues is one way of making tough choices about what topics are worth discussing even in the face of possible criticism from parents or board members.

Good objectives don't take time, they save time.

The list on the previous page is permeated by a basic premise: *a detailed set of learner objectives does not add to a teacher's list of time-consuming tasks.* Writing a detailed set of class objectives may concentrate some of the time-demands in a different month of the year, but each minute of careful objective-writing saves at least a minute of time preparing daily class materials or evaluation instruments.

Dozens of teacher guides provide specific hints about writing behavioral objectives. For more about this subject, consult a general source such as Norman Gronlund's short book: *Stating Objectives for Classroom Instruction*.

Elements of a well-worded behavioral objective

In this book, it may be enough to underscore the generally accepted conclusion that a well-phrased behavioral objective contains a specific statement of:

a setting,

the specific task to be performed,

the expected level of performance, and

a likely method of evaluation.

Here are twelve geographic examples, representing a variety of grade levels, degrees of abstractness, and time requirements (from part-day to whole-term). The sequence on this list goes from concrete to abstract, which is not the same thing as grade level; elementary, middle-school, and high-school objectives are mixed together in this list.

Examples of well-worded geography objectives

Given a list of four "million-plus" cities and a world map with four dots showing their locations, write the name of each city next to the correct location.

Given the latitude-longitude coordinates of two locations and a map (or globe) with a latitude-longitude grid and a bar scale, plot the locations and measure the distance between them. (You might even add an expected level of precision, such as "within five hundred miles of the correct distance".)

Given three photographs of typical buildings in a Japanese city, arrange them in order of date of construction [or distance from town center, or apparent wealth of the owner] and explain why you put them in that order.

Given a topographic map, determine the elevation of two specified points, select an appropriate horizontal scale and amount of vertical exaggeration, and draw a side profile of the terrain between the points.

Given a set of four population pyramids for different countries, match them with the appropriate names from a list of five countries. (A larger list of countries minimizes process-of-elimination logic and thus makes the test more statistically valid.)

Given a dot map of population and the sites of five existing stores in a small city, outline the market area of each store and estimate the population there. Then, make a recommendation for the location of a new store.

Given a street map of a town and the addresses of four video-rental stores, choose an appropriate location for a fifth store and write a brief outline of a presentation that justifies your choice to a group of investors.

More examples of well-worded geography objectives

Given a description of the climate in a place, cite a climatic analog (a similar climate on another continent) and briefly describe some similarities and differences in the way people live in the two places.

Cite and briefly explain three different cases in which a human action that was appropriate in one environment (e.g., a forested region) turned out to be dangerous, damaging, or otherwise inappropriate in another environment (e.g., a desert).

Given a news event in a particular location, find four thematic maps with information that may be useful in interpreting the event, and use these maps to illustrate an essay that describes the background for the event.

Given a thematic map, describe the graphic vocabulary that is used on it (e.g., isolines, graduated symbols, choropleth shading, etc.) and discuss whether this particular choice of symbols is acceptable as a way to communicate the topic that is the subject of the map.

Given an environmental issue and a description of a particular interest group in the local population, prepare an outline for a presentation that summarizes the group's position on the issue. Design several maps and other graphics that are technically accurate but also present the information in a way that might persuade a jury of the validity of the group's position.

Behavioral objectives should use active verbs

Note that these objectives do not use teacher-oriented terms such as "cover this topic" or "present this material." Nor do they use within-the-student terms such as "understand" or "comprehend." Objectives that begin with those verbs provide little guidance in trying to decide how to choose teaching tactics, conduct class discussions, or devise evaluation instruments. Some people say that broad ("cover" or "understand") objectives have a role in defining the scope of topics in a course. I suggest that they are a waste of time even for general planning -- it is no harder to write good specific objectives right from the start.

So, to repeat, *a useful objective should include a setting, a task, an expected level of performance, and an implied (or maybe even a bluntly stated) method of evaluation.* Once the task and a level of performance are set, a teacher can use the written objective as a guide in selecting appropriate examples, visual aids, and other strategies for presenting the material. In that way, students will receive a systematic exposure to the ideas, skills, locations, and place traits that were deemed important in the list of objectives. The design of evaluation instruments

Designing test questions and other evaluation devices

"So is this going to be on the test or not?"

It depends on what you call a test.

Designing tests to fit different kinds of learning

Different kinds of learning require different modes of evaluation. Using a time-intensive mode, such as an essay test, for a factual objective is evaluative overkill. It wastes time for both students and teacher, and it does not really provide any more information than a well-designed true-false question could.

By the same token, trying to evaluate student understanding of some theoretical point with a true-false test is likely to be frustrating for both students and teacher. Good students almost always read something into the question that the teacher did not see, and bad students have a 50/50 chance of getting even a well-designed question correct.

The key is to match the mode of evaluation with the cognitive strand of learning involved. In general, *matching and multiple-choice questions work just fine for checking student knowledge of locations and place traits.* This kind of knowledge does not demand elaborate modes of testing (especially if students are told in advance that they need this factual knowledge for theory and evaluation, but we do not want to waste valuable time testing it in labor-intensive ways).

In large classes, multiple-choice questions are especially handy because it is easy to devise multiple forms of the test. For example:

A sample test question with multiple forms

___ Which of the following features are typical in the landscape of northern China?

A) rice fields
B) wheat fields
C) desert basins
D) tin mines

Substituting "southern" or "western" for "northern" makes A or C the correct answer instead of B. Creating several forms with these subtle alternatives makes a test virtually cheat-proof.

Another advantage of multiple-choice tests is that computer item-analysis can check the difficulty and validity of the questions. Freely admitting that a particular question was poorly designed can sometimes be an effective transition into a review of a topic that the students did not master as well as desired.

Some people object to a matching or multiple-choice test because it seems too much like "Trivial Pursuit." One possible response to that objection is a blunt statement like: *Facts are an important part of learning; get used to it.*

A more diplomatic and ultimately more effective response is a carefully prepared multi-stranded list of objectives. This list should clearly specify the kind and amount of factual knowledge that is needed in order to achieve the desired theoretical understanding and evaluative insight.

"Categorilla" -- term coined for the longest, deepest, highest, most exceptional feature in each category

That is another good defense for the practice of detailed objective-writing: it forces the teacher to decide whether a particular kind of fact is really worth knowing. It is all too easy to fall into the trap of teaching **categorillas**. These extreme statements definitely help grab and keep student attention. It is much harder, however, to show that students gain a balanced perspective by learning about places that have the biggest ball of twine, the longest suspension bridge, or the best art museum in the country. Having to justify the teaching of specific facts in terms of their utility in learning geographic skills or theories is a good discipline against picking facts just for their shock value or memorability.

In short, a good set of course objectives can provide the a solid foundation for the process of choosing examples and anecdotes for everyday class use. A teacher can also use that same criterion to evaluate textbooks and other course materials: a well-crafted text should have clear evidence that the primary objectives of each chapter were instrumental in guiding the selection of text illustrations, photographs, graphs, and other visual aids.

That integrated approach to class design, of course, demands that teachers do exactly what we want students to learn how to do: to think in multiple strands -- images, explanatory theories, and value judgments -- at the same time.

And that, in turn, requires teachers to write multiple objectives at the same time. In other words, *teachers should be thinking about how to evaluate their non-factual objectives even while they are making up tests for their factual objectives.*

Designing evaluation tools for non-factual objectives

HOTS --

higher-order thinking skills

(See Postscript 3)

The list of learner outcomes for a geography class should include all of the cognitive strands that form the geographical rope. The other strands, however, are not as easy to evaluate by the same methods that are used to test factual knowledge. Applications, analyses, syntheses and other so-called **higher-order thinking skills** are best tested with essay questions, projects, and other open-ended methods.

authentic assessment --

evaluating mastery of skills or concepts in ways that mimic their real-world application

Here, the National Geography Standards are right in line with the **authentic-assessment** movement. Their focus on analytical skills as well as factual knowledge implies the kind of evaluation that involves demonstrating the ability to use the skills in realistic situations. The best way to test that ability is (wait for it!) to create realistic situations and ask students to use the skills they have learned.

The basic method of evaluating basic skills of map creation and analysis is simple: give students some data and ask them to put the data on a graph or map and then interpret the result. The key to efficient and effective evaluation of their performance is to make a separate appraisal of each major step in that process: processing of data, selection of map symbols, analysis of the pattern, and interpretation of the map.

It helps to remember that there is a logical "gap" between the domain of concrete facts and the domains of theories and value judgments. In that gap are some fundamental analytical skills, such as measuring distance, calculating density, or specifying direction. These can be tested in a variety of ways: with projects, lab exercises, or multiple-choice tests.

Given the nuts-and-bolts nature of these skills, it is often good body-language to treat skills as essential means but not ends. This implies downplaying their significance as anything other than vital intermediate steps between raw sensory impressions and the kind of systematically gathered data that can be used to suggest or test hypotheses.

This is another argument for always using real places to teach skills. Devising an imaginary town or continent to teach a skill implies that the skill is of primary importance and the place secondary. Setting the lesson in a real place conveys the idea that the skill is worth knowing only insofar as it contributes to our understanding of places.

Modular skill tests let you use similar forms for practice and the test.

One way to accomplish this is to give students a sample of the **skill tests** in advance. In primary grades, a teacher could distribute a prop such as a ruler or compass and say, "tomorrow we are going to use this ruler to measure the distance between two places on a map. Here is an example we will practice with today." The Say something like:

> "these are the skills we need to do X, and this is how we'll know when we master them. I will give you a form just like this one on Friday, but the map will be different. You will have no trouble seeing the changes in the questions, because the words and numbers in italics are the only ones that might be changed to other, similar terms. So, the test will be basically the same as this sample -- it will be the same kind of questions but in a different place! Therefore, you can practice with this sample skill test. You can even make up similar forms to test each other. If you have questions, ask me during study break."

Figure 7A is an example of this kind of skill test; in time, these could be transferred to a computer, which could use the answers to the first few questions to select additional questions that fit the exact level of individual students.

Mental maps can be tested with matching questions or sketches.

A qualitatively different kind of knowledge is the set of mental maps of important phenomena that geography students should acquire and use in making their analyses of the world (recall Figures 3I to 3O?). These can be tested in two different ways: by asking students to sketch a map of a specific feature, or by asking them to match several maps with a list of the phenomena they represent. Figure 7B is an example; the back side of the page shows how to adjust the level of complexity of this kind of matching test.

Short essay tests are one way to evaluate student understanding of geographic theories. Theories become much more meaningful if students have to apply them in the context of real-world situations. Figure 7C is an example; it shows how students can be asked to link a historic process with present-day features.

In addition to these written tests of factual knowledge, skills, and theoretical understanding, teachers should make an explicit attempt to evaluate the ability of students to marshall data in support of a value judgment. Essay tests or term projects are one way to do this, but one should not downplay the value of simply observing student participation in group or class discussion. This can often provide insight that complements what you get from other forms of evaluation. For example, Figures 7D and 7E are some instructions and evaluation criteria for one kind of community profile (like Transparency 3B). A teacher can easily extend the evaluation to include an assessment of the research strategies that students choose, the questions they ask, and the advice they give each other.

The ultimate test of geographic insight and competence is real-world performance. Can a student identify features "out there," formulate hypotheses about why they are located where they are, test those hypotheses, and make reasoned value judgments about the locations?

Evaluating performance in the field is difficult, even under ideal circumstances. For this reason, teachers should start by making sure that field trips and travel are seen as key components of a geography class, not as respite from it.

This has implications for both the classroom and the field experience. Classroom activities should be justified in terms of how well they support the goal of geographic competence in the real world. Field experiences should be as carefully structured and theme-driven as the classroom activities, *and they should be evaluated* (Figures 7F and 7G).

Multiple forms of evaluation are insurance against misjudgment

In sum, different kinds of objectives require different means of evaluation. Moreover, using multiple evaluation tools is a form of insurance against misjudging students who simply do not perform as well on certain kinds of tests (more about that below).

There is more than a bit of truth to the rumor that good teachers seek evaluative tools that provide hard numbers to support what we already "know" is the correct grade for individual students. That is why teachers should be ready to articulate their objections to standardized tests that do not span the entire range of desirable learner outcomes.

One can use standardized tests as a convenient third party to help motivate students. They play a useful role in helping teachers redefine the mood of classroom as "you-and-me-against-the-test" rather than "me-against-you." But teachers should resist any attempt to have the standardized test be the sole measure of success. At the very least, they should insist on a formal mechanism to add teacher comments to the same page of the student record that includes the standardized test scores.

Evaluation without grades

Before we leave this chapter on evaluation, do we want to open the can of worms labelled "ungraded?" Not me. I am willing to concede that the assessment of performance can have different bases -- absolute, relative to other students, or relative to previous performance by the same student. But I am in the business of educating in order to change students' ability to perform. That raises a pointed question: how can I judge how well I am doing, unless I at least try to measure how well students can perform? Any rigorous attempt at measurement is bound to be confounded with the idea of grades. It is as simple and as complicated as that.

Ungraded classes?

Different kinds of intelligence

There is another can of worms, however, that is not so easy to keep closed. Recent studies in cognitive psychology (e.g., *Frames of Mind* by Howard Gardner) have suggested that different students may have different preferred modes of learning -- verbal, spatial, numerical, kinesthetic, etc. The topic has been confounded by people who blithely use the term "intelligence" to describe these different learning modes. They speak of "verbal intelligence," "kinesthetic intelligence," etc.

Frames of Reference:
the Theory of
Multiple Intelligences

In one way, this new rhetoric is much like "the" five themes of geography: we have already covered the basic principles in previous chapters on disciplinary perspectives, cognitive strands, and modes of instruction. Still, it might be worthwhile to review one key idea from Chapter 1: *Geography is not just a kind of knowledge, it is a qualitatively different perspective on the world.*

The discipline of geography begins with the assumption that looking at locations, distances, and other spatial relationships can help people solve problems. To attack a geographic problem, we describe locations, gather sensory impressions, write verbal descriptions, perform quantitative analyses, display the results on maps, and occasionally use musical, artistic, or poetic analogies to interpret the results. In so doing, we employ many (if not all) of the "intelligences" listed in some of these popular articles.

In short, geography is an easy subject to adapt to a classroom mode that explicitly tries to acknowledge different learning styles. A conscientious teacher with a well-conceived set of objectives can choose modes of instruction that cater to different learning styles. *In so doing, we may help* counter the temptation to pigeonhole people according to their self-evaluative statements (e.g., "I hate mathematics" or "I can't learn by role playing").

It is a sad day
when students tell you
what they cannot do.

I suppose if I were asked for a summary statement about learning styles, my answer would be that no individual is exclusively verbal or musical or whatever, and no one is hopelessly unintelligent in any of the learning modes.

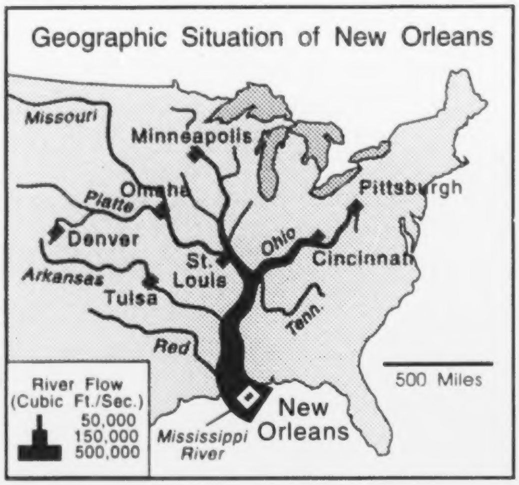
Every student can learn how to learn in different ways, and geography is a good subject for that kind of exploration. If teachers consciously plan multi-media experiences, cooperative activities, field trips, simulations, and evaluation instruments that employ different learning styles, students will all be richer for it.

8

PAIRS OF TOOLS, WORKING WITH EACH OTHER

Look at the location of New Orleans, Louisiana. This old French and Creole city has a superb **situation** (using that word in its precise geographic sense). It is located near the mouth of the largest river system on the continent.

Here, millions of tons of cargo are transferred between ocean ships and other modes of transportation: river barges, trains, trucks, or pipelines. All of that activity means jobs, not only for dockworkers but also in restaurants, hotels, banks, and other businesses.


Geographic Situation of New Orleans
Missouri
Minneapolis
Omaha
Platte
Pittsburgh
Denver
Ohio
St. Louis
Cincinnati
Arkansas
Tulsa
Tenn.
Red
500 Miles
River Flow (Cubic Ft./Sec.)
50,000
150,000
500,000
New Orleans
Mississippi River

Much of the New Orleans economy is thus a direct result of the favorable geographic situation of the city.

Situation --
connections with other places

The geographic **site** of New Orleans, on the other hand, leaves much to be desired. Most of the city sits on mucky soil in a flood-prone swamp infested with snakes and mosquitoes. Huge pumps have to run most of the time to keep water from backing up in the sewers.

Site --
local conditions at a place

To be blunt, the site of New Orleans would probably not be on anyone's list of preferred places for a major city. People learned to cope with the unfavorable site in order to take advantage of the superb situation.

To a geographer, the concept of location is always an interplay of these two ideas:

Site and situation --

two blades of a geographical scissors (see Chapter 2)

site -- local conditions (the traits of a *place*, to use the language of "the five themes" from chapter 5), and

situation -- connections with other places (the ease of *movement* of people, goods, and ideas to and from the location).

The ability to judge site and situation from maps is clearly a useful skill for planners and business decision-makers. This skill can also help ordinary people judge where they would like to live, work, or take a vacation (Figures 8A and 8B).

Site and situation (place and link, status and movement, local conditions and global connections) are the opposing blades on a very useful pair of geographical scissors (as discussed in chapters 2, 4, and 5). They are one of a handful of seemingly unlike pairs of concepts that are pedagogically useful when used cooperatively. This chapter is a summary of some major ideas of geography, expressed in terms of the process of more-or-less simultaneously using seemingly opposed but actually cooperative ideas.

Nature and culture (physical and human geography)

Cultural definition of resources --

a feature is a resource only if people think it is

In evaluating places, students should keep in mind that what makes a location useful depends on the *culture* of the people there as well as the *nature* of the place. Here are three examples of this principle (the **cultural definition of resources**, as illustrated in the discussion of place in Chapter 4):

1) A rock that is rich in iron ore is a resource only if people have the technology to use iron. If that kind of technology is not available, iron ore adds no value to a site. With an appropriate infrastructure of mines and steel mills, however, a rich deposit of iron ore can make people in an area quite wealthy.

Levee --

long dam to keep water out of an area

2) A flood-prone field is useful for farming only if people grow crops (such as rice) that can tolerate flooding, or if they have the technology to build protective **levees** or drainage systems. Once that infrastructure is in place, however, floodplains usually rank among the most productive agricultural areas on earth.

3) A great natural harbor has little value unless you need to move heavy products. Diamond producers, for example, are not likely to care that transportation by boat is much cheaper per ton than any other mode. Their product is so tiny that producers can send it by airmail!

In short, a geography student cannot just assume that a given natural resource will automatically encourage a particular human activity and produce a specific set of landscape features.

That belief is called **determinism**. The discipline of geography erred too far in that direction in the early 1900s. People back then were writing books that described intelligence as a consequence of climate. They said that tropical climates tended to cause laziness and forgetfulness. Therefore (they said), it makes no sense to build schools or factories there.

Determinism --
the belief
that conditions
in specific places
determine what
people do there

This kind of extreme position cannot last long when people are free to investigate the world. An honest, rigorous geographical analysis reveals many examples of people who overcame severe environmental problems, from heat to cold, flood to drought.

While we are trying not to be excessively deterministic, however, we should not assume that human technology can impose its will on any environmental condition. As with most dichotomies, the answer lies in the middle. Nature and culture work together to define what is possible in a given place.

I know, you can grow bananas at the North Pole, if you are willing to spend enough money for light, heat, and shelter. But would you really call that **possible** in an economic or political sense? That is just the point. *The interplay of natural and cultural traits is what gives a specific location its list of possibilities and challenges.*

Possibilism --
the belief
that people can do
whatever they want
anywhere

If this is so, is it desirable to have separate courses in physical and human geography at the introductory level? It may be better to have one course in which students use real-world data to make maps and then apply them to interesting questions such as

"Why is a guerrilla war in Bosnia so hard to stop?"

"Why do people in Utah tend to vote Republican?"

"What city should get the new professional baseball teams if the league expands?"

"What countries are likely to join South Korea and Taiwan on the list of "Asian Tigers," the countries that have experienced rapid industrialization and rising incomes?"

"Where is the best place for an international historical theme park?"

"Should cities and suburbs merge into a single metropolitan government in order to solve urban problems?"

Answers to questions like these will automatically involve learning about locations, environmental conditions, cultural features, and links between places. If the questions are carefully chosen, and the data are relevant, the result can be fairly complete "coverage" of major world regions, map skills, and geographical theories. (To see if coverage is complete, make a matrix such as Figure 2F.)

Alternatively, one could organize a class with a focus on a few selected regions. In this case, a teacher can maintain the scissors action by using a specific economic, political, or environmental issue as an organizing theme in each region. The key is to have a specific set of "skill," "evaluation," and "appreciation" objectives in mind in each region. That will keep the course from drifting into being a mere catalog of the physical and cultural features of each region.

Here are three examples of the kind of objective that works to keep physical and human geography together:

Flowline map --

map that shows volume of movement by varying the widths of arrows or lines

Given a table of imports and exports from a given country, make a **flowline** map of the data. Then, try to describe the conditions (environmental, economic, or whatever) that allow people to produce those products in each region. (You might add another sub-question: what kind of infrastructure did people have to build in order to take advantage of those resources?)

Given a location and a photograph of a house, describe three specific construction details of the house. Then, state whether (and why) you think each of those traits is appropriate in that particular location (recall Figures 3C and 3D?).

Climatic analog --

place with a similar geographic position on another continent (e.g., central Brazil and Zaire)

Given a latitude and longitude (or a dot on a map), write a brief description of the climate at that place (e.g. southern California). Then, cite an example of a place on another continent with a similar climate (an **analog**, such as Portugal or southern Australia). Finally, describe several similarities in the way people live in those regions. How are those lifestyle traits related to the climate?

Note that each question specifically asks a student to combine information about environment and culture in order to get an answer. At the same time, each question starts with a "simpler" sub-question. That allows beginning students to achieve some success even if they do not get the entire question the first time around. One often has to learn to walk before trying to run, but it does not hurt to do both on the same good path. This principle is even more important as we consider other dichotomies, such as between theoretical and applied geography or between regional and topical geography.

Knowing and doing (theoretical and applied geography)

For some people, geographical knowledge is worth acquiring for its own sake. Others see it primarily as a means to other ends. For them, geographical knowledge is a path to a more efficient or humane society (or perhaps just a larger income). To examine the interplay between theoretical and applied geography, let us look at five groups of geographers. Each group has its own professional organization to further its agenda.

1) Some people study other places for the sheer joy of knowing. For them, geography is an adventure. Their goal is to see, hear, smell, taste, and feel exotic places and cultures. The main criterion for choosing places to study is uniqueness. The more unusual a place is, the better they like it.

National Geographic --
exploring exotic places

Dozens of television shows and magazines cater to the large demand for this kind of experience. In geography, the most vocal proponent of this perspective has been the National Geographic Society. Based in Washington, DC, this venerable organization has sponsored thousands of expeditions, hundreds of films and television specials, as well as the magazine that bears its name. In recent years, the Society has started to do more formal education and even theoretical research, which formerly would have been called the "domains" of other groups.

2) Some people study other places in order to discover patterns and draw conclusions. The main goal is to understand and organize knowledge. (That urge may be as genetically strong in humankind as the urge to explore!) The reward for this study is an elegant theory that ties many observations together into a neat package.

Geographical Review --
understanding other places

The professional organization called the American Geographical Society has this perspective. The journal of that group, the *Geographical Review*, has many articles about how specific places operate and evolve.

3) The third group on this list -- the Association of American Geographers -- goes even farther along the path of trying to develop geographical theories. The primary focus of this group is research. To exchange ideas, the AAG has annual and regional meetings with literally hundreds of sessions devoted to specific topics such as "Medical Care in South

The Annals --
doing research in spatial theory

Asia," "Urban Transportation in Japan," "Economic Restructuring of the English Midlands," or "The Biogeography of the Andes Mountains." The primary journals of this group are the *Annals* and *The Professional Geographer*. Many subgroups within this group have their own journals. These include *Antipode* (the journal of radical geography), *Economic Geography*, *Geographical Analysis* (for mathematically-inclined geographers), *The Southeastern Geographer*, and *Urban Geography*.

URISA --

doing geography in the real world

4) A fourth group of geographers is concerned with using geographical ideas to solve real-world problems. These "applied" geographers have basically the same range of interests as research geographers. Their studies tend to be much narrower, however, and usually have tight deadlines. These people often work in businesses, travel bureaus, or government agencies rather than universities. (Like many of these "divisions," that distinction has a great deal of overlap. Professors often act as consultants or do other applied geography . Agency people, meanwhile, contribute to theoretical journals). Typical jobs for applied geographers include:

- forecasting traffic,
- analyzing the spread of diseases,
- deciding where to locate things such as new factories or sewage treatment plants,
- drawing borders around election districts to assure fair representation for minorities,
- evaluating the environmental impact of new settlements or subdivisions.

In recent years, applied geographers have started a number of new journals, including the *Papers of the Regional Science Association* and the *Proceedings of the Urban and Regional Information Systems Association*. (I think that's the name; hardly anybody says anything but URISA!)

Journal of Geography --

learning and teaching

5) The last group consists of educational geographers. They see geography both as a worthwhile subject in its own right and as an idea that can help integrate art, economics, history, languages, mathematics, and social studies in classrooms. The main organization for educational geographers in the United States is the National Council for Geographic Education. The NCGE publishes the *Journal of Geography* and many other teacher-oriented publications.

Like the distinction between regional and topical geography, the "splits" between theoretical and applied geography, exploratory and educational geography, are more apparent than real. Those geographers who stay too long within any one camp tend to lose the creative tension that occurs at the interface between groups. After all, it is human needs that provide the strongest motivation for research and understanding. At the same time, a good theoretical discovery has the potential to make the work of an applied geographer both easier and more useful.

For that reason, this book has used examples from the journals of each organization on this list, but it has avoided using any of these terms until this second-to-the-last chapter. The foregoing list of orientations, organizations, and journals is put here primarily as a guide for those who are browsing through a library or trying to line up a guest speaker. In those tasks, some guidance in avoiding "cognitive misfit" might be helpful!

* * *

Place and process (regional and topical geography)

Regionally organized courses have a tendency to become boring catalogs of features ("if today is Tuesday, this must be Belgium"). This tendency is what leads some geographers to propose that geography courses should be organized *topically*. In that kind of course, units would have titles such as population geography, economic geography, or political geography.

This topical approach is also subject to caricature, when it becomes just a series of process discussions illustrated with world maps. The most effective geography uses both approaches, like two blades of a **scissors**:

> Regional examples provide the "puzzle" (human-interest angle) that makes looking at maps and global patterns seem worthwhile.
>
> Topical ideas provide the broader view that helps put local facts into perspective.

The analytical scissors of geography --

regional examples and topical ideas working together

(see Chapter 2)

As noted in chapter 2, the contrast between regional and topical perspectives is much deeper than the simple definitions of the terms might suggest. Regional approaches tend to be more local in scale and descriptive in tone. They combine information from a variety of sources to describe what is happening in a specific place. By contrast, topical outlines are usually more global and analytical. The differences are evident in the kinds of maps that tend to be used with each approach.

This classification of maps formed the core idea of Chapter 2, but it is so important that a brief review might be in order. It is convenient, at least conceptually, to recognize two fundamentally different kinds of maps:

Review of reference and thematic maps

> A **reference map** uses a variety of symbols to show the positions of dissimilar features that occur together in a specific area. This kind of map seldom can show a large area unless the map maker deliberately chooses to omit features. As one does that kind of simplification, a reference map gradually becomes more and more like the other kind of map:
>
> A **thematic map** uses a few conventional symbols to show the spatial pattern of one variable (or at most a limited number of variables). The size of the area shown on a thematic map can range from a backyard to the entire globe. Most thematic mappers, however, try to cover a large enough area to provide perspective for specific places in the area.

In practice, these two categories of maps usually overlap. A reference map usually has to omit some features to avoid being unreadably complex. Meanwhile, a pure thematic map is difficult to read without at least some reference information (Figures 8C and 8D).

Despite this overlap, the distinction is worth noting, because it highlights the two analytical perspectives that geographers use to focus on what is happening in a specific location.

The main point of this chapter

Do not use halves of these dichotomies as unit titles in a class.

They work best when applied simultaneously, not sequentially. That might seem hard to do when a textbook breaks the field down into specific topics or regions. The difficulty is more apparent than real, however. A teacher who has a specific set of themes (and a detailed set of well-worded behavioral objectives) can easily provide the conceptual cross-links that are needed:

Putting student experience against the text in order to create a conceptual scissors

> If the text is using general phrases and thematic maps, try to redirect student attention (once in awhile) by asking how the generalization applies in a specific place. For example, in a lesson on urban geography, show a photo of a high-rise apartment building. Then ask where that kind of building is likely to be found on the textbook's

map of "a typical city." Or, provide a description of a person's activity or lifestyle and ask where it would fit on the map of land use.

If, on the other hand, the text spends most of its pages describing specific places, try to redirect student attention (once in awhile) by asking how a given place fits into a broader picture. For example, show a transparency of a thematic map of rainfall. Then ask students to point at places on the map where a particular photograph in the text might be found. Ask how the information on the map helps explain what they see in the photograph.

This kind of redirection is especially useful if done with a newspaper or magazine as the "foil." Tie a newspaper account of a flood, for example, to a thematic map of airmass source regions. Or, tie a magazine map of the "nation's best hospitals" to a written description of the philanthropists and doctors who started well-known hospitals such as the Sloan-Kettering Cancer Institute or the Mayo Clinic. In this way, students begin to realize that these famous places did not arise in a vacuum. Like most features in the landscape, they are products of the interplay of nature and culture in specific places.

Taking advantage of the teachable moment

A detailed list of learner outcomes (such as the **National Geography Standards**) allows a teacher to take advantage of ephemeral student interest in particular topics. The key is to scan the Standards and classify them according to the natural "hooks" one might use to get students interested in each particular bit of knowledge.

National Standards -- lists of learner outcomes prepared by teams from various disciplines

(see Postscript 5)

Some topics seem to lend themselves to treatment in response to current events. Each teacher tends to have a somewhat unique list of these topics, depending on personal experience and the nature of the class. Many teachers, however, would find the Standard on plate tectonics much easier to "cover" in the context of heightened student interest just after a major earthquake (Figure 8E).

The Standard on flows of investment, by contrast, probably fits better in a highly structured discussion of world patterns of production, consumption, energy use, and other aspects of the world economy. That assertion about the difficulty of teaching about the world economy in an ad-hoc manner in response to news events is true, unless your community has the economic misfortune (but pedagogical good fortune!) of a major factory shutdown during the class.

There is an obvious danger in either extreme: a completely ad-hoc class "organization" or a rigid sequence of topics. For that reason, let us just call this another pedagogical dichotomy for which the correct answer is usually "both." A teacher might look over a list of desired learner outcomes for a course and classify them into three rough lists:

1) topics that seem easy to teach (for that particular teacher!) in response to daily news events;

2) topics that seem best to teach in a prescribed sequence;

3) topics that could go either way, depending on events, student mood, time of day, day of week, month of year, teacher health, cloud cover, amount of time before or since vacation, etc.

The skills of geography -- finding information, making maps, looking for patterns, writing descriptions of places, evaluating infrastructure, etc. -- can be combined in many different ways with the list of places and theories to be "covered." The authors of textbooks should choose appropriate local examples to illustrate general principles. Likewise, authors of student activities should try to apply an appropriate skill to a specific geographical theory in a suitable real-world location. Teachers should insist on a seeing a table or list of those cross-connections when evaluating a book. This kind of careful forethought is a good clue to the quality of the book!

If an author provides a table or matrix that shows what skills and ideas are taught in the context of what places, a teacher can substitute other skills or places to suit a particular class at a particular time. An advanced teacher can use the same principle to assemble a course out of raw materials from several sources (such as the ones listed near the end of Chapter 6 or in the Appendix).

In short, many of the opposing blades of geography teaching can be interchanged by substituting another place, data set, map, or skill for the one specified in the text or workbook.

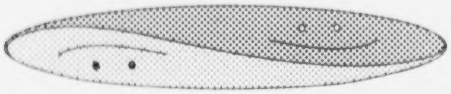
teachable moment --

time when students are primed for a topic by events outside the classroom

Individual teachers can choose what topics they feel comfortable putting on the list for discussion at the **teachable moment**. The key is to treat those topics in the same way as the everyday ones. In other words, focus on an interplay of site and situation, place and link, region and topic, theory and application, physical and human features, local and global scales -- all the word-pairs that help to capture the essential geographical perspective.

If the perspective stays firm and identifiable, occasional excursions away from the "regular" outline provide a sense of immediacy and practical value. That, in turn, makes it easier to continue with the planned sequence of geographical stories on the "ordinary" days.

So what is a geographical story? That is the unitary topic for the final chapter in this book. There is, however, one additional "both-and" dichotomy that is important for a geography teacher.



Freedom, the Tao, and other existential dilemmas

Geography is "about" a mundane thing -- the spatial arrangement of hills, roads, houses, video stores, murals, and other landscape features. Like leaves on a tree, however, those visible features reflect the nature and vitality of the roots. Those roots are the beliefs and aspirations of the people who live and work in a place.

> If you change the cultural "roots," the landscape "leaves" will respond. Societies with different ideas and values have created very different landscapes, even in similar environments. That is how landscapes form/change.
>
> If you change the leaves, the roots will respond. Enforcing a rule that rewards or punishes some kinds of behavior will in due time change the beliefs of people. That is how cultures evolve/persist.

Like the other dichotomies in this chapter, the pedagogical answer to a question about freedom and structure is "both, in balance." From the "jen/t'ien" of Confucius to the "becoming/being" of Luther and Kierkegaard, most human philosophies have converged on an unfathomable mystery: *individual human beings achieve their fullest freedom when they help build (and thus partially lose themselves in) a mutually sought larger realm.*

For example, as a research geographer, I long ago concluded that it would be pointless to measure the depth of soil in different places if that investigation did not simultaneously address part of the issue of social justice. On the surface, I seem to be interested in specific technical questions about soil traits and erosion. That's true, but it is not the whole truth. I study those narrow issues precisely because I am intrigued by broad questions about the interplay of environment and mind.

Here are a few of those questions: would my German ancestors have learned such a strong ethic of saving if they had grown up in an environment where fruit was ripe for the picking every month of the year? What is the role of children's stories such as Three Little Pigs or Grasshopper-and-Ant in passing this kind of belief to the next generation? To what degree should we view the much-discussed "German" or "Japanese" economic attitudes as results of growing up in an environment where the soil freezes part of the year (and families who do not think about saving might die before spring)?

These are intriguing questions, because they get at some of the dichotomies we have been discussing: perception and "reality," nature and culture, physical and human geography. We probably all agree that people behave on the basis of what they perceive, not what is "really" there. What they perceive, however, does depend (often in very complex ways) on what they learned in childhood.

A person's "predisposition to perceive" in particular ways, therefore, has been and still is affected by what is "out there." So, as a research geographer, I study topics such as soil depth because I think they have an influence on perception, ethics, and cultural beliefs. I am persuaded that we will not achieve social justice if we are ignorant of geographic differences in soil depth. I come to that conclusion for a whole lot of reasons, some easy to explain and some that seem quite obscure on first glance.

Let us look just at one example. It is a medical fact that a child whose diet has particular nutrient deficiencies will probably not develop "normal" brain capacity. It is an ethical imperative to try to prevent that personal catastrophe, especially once we suspect that it is related to some environmental condition beyond a child's control (such as parental income, food-purity laws, or even soil depth!)

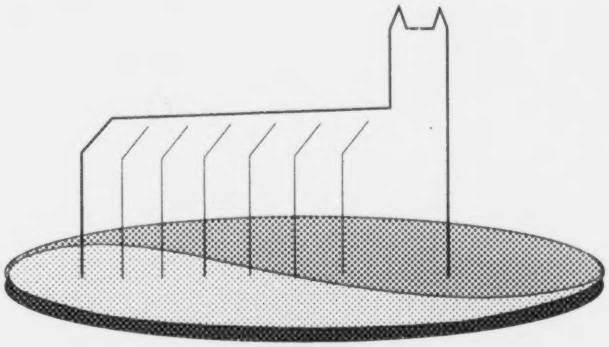
This is the kind of logic that helped people solve some medical mysteries. Records of several nervous disorders, for example, showed them to be more prevalent in urban areas with old houses and a lot of auto traffic. That led some researchers to measure the level of specific chemicals in the environment and in the blood of young children. Once we found a medical link between health problems and the amount of lead in a person's bloodstream, politicians decided to ban lead in paint and gasoline.

In other words, it took a cooperative effort by many disciplines, each looking at the world through its unique perspective, to solve the problem. An educator tabulated test scores. A geographer made maps of lead in house paint and playground dirt. A doctor studied symptoms in children. A chemist tried to find an anti-knock chemical that could be used instead of lead in gasoline. All of these people could legitimately say that the goal of their work was to prevent brain damage in children. Moreover, all could say that they made their contributions because of (not in spite of) the fact that they were working within the constraints of an academic discipline. It is another example of the mutually agreed-upon self-restraint that is an essential part of true freedom.

> (Wait a minute! Can an academic discipline become a strait-jacket that limits thought? Of course; nearly every discipline can point to times in its history when people had fallen into a perceptual and conceptual rut, and someone had to invent an entirely new paradigm of thought. The classic example, often cited in history-of-science books, is the "scientific revolution" that occurred when Galileo and Copernicus formulated a new sun-centered view to replace the incomplete and inadequate earth-centered model of the universe.
>
> I agree that new paradigms may occasionally arise: but in a time of considerable discussion about new paradigms in many disciplines, I also submit that the number of truly new paradigms is far, far fewer than the number of people who would dearly love to be extolled by generations of admiring followers as originators of new paradigms. In the case of geography, I think we have more than enough good paradigms at the moment -- what we need are some more practitioners out there doing good research and teaching! Before I get too far into that particular sermon, however, perhaps I should just admit that although I have plenty of opinions about philosophy, this is supposed to be a book about teaching; I'd better just conclude this chapter and go on.)

So, I am a geographer who measures the depth of the soil in order to understand more about how people think. Like the medieval craftsman who was asked what he was doing, my answer is that I dig holes in the ground, in particular places for my own reasons, but I am also (at exactly the same time) helping to build a cathedral.

It is that unity of ground and spirit that is so satisfying in the discipline of geography. (No doubt a similar metaphysical unity exists in other well-founded human endeavors, but this book is about geography!) The unity of geography is the topic of the concluding chapter in this book.



Postscript: about computer programs in geography

First, a confession. I like computers. I am typing these words on one. All the transparency masters were drawn with a computer. A third one helps us store and manipulate census data. My wife teaches cartography (map-making) and has several more. We take a computer in our car when we travel. There is even a computer hooked to my synthesizer when I'm in the mood for making music.

And some geography computer programs are spectacularly good at grabbing student interest.

Where in the World is Carmen SanDiego? helped put geography back in the public eye. If not balanced with sound geographic theory, however, this program can make geography a trivial pursuit with little perspective.

Travel planners such as *Automap* or *Map'n'Go* are valuable in planning a trip. At the moment, these programs don't show how places are related except by distance.

Sim City, *Sim Earth*, and their clones can introduce the idea that decisions have consequences. If not balanced with facts about real places, however, students can get the impression that the world is malevolently organized.

The *Oregon Trail* shows how a computer can link history, geography, and decision-making in an intriguing way. Students need guidance in trying to transfer these decision models to the real world.

A variety of computer atlases, mapping programs, and encyclopedias will soon become standard references. Students need guidance in using these references.

The Internet and its many strands are great ways to connect a class with information or peers in other places.

In short, the computer is a great teaching resource (as is a camera, tape recorder, overhead projector, etc.). Someone, however, must always be monitoring the balance between local and global, nature and culture, perception and "reality," freedom and responsibility. As modes of data storage and delivery become more sophisticated, the teacher's role as diagnostician becomes more vital.

If indeed new technologies have the potential to engender more powerful learning, then it is even more important that someone be watching to see that things stay in balance. That is precisely the kind of thing that live teachers have to do, conscientiously and skillfully. That means knowing the programs, their objectives, and the symptoms of typical student responses to them.

If people can sue a computer maker because they claim to have been injured by a keyboard, shouldn't society think long and hard about the side-effects of powerful educational technologies?

9

A SINGLE DISCIPLINE: A WINDOW ON THE WORLD

At the scale of an individual, the practical value of geographical knowledge boils down to the ability to answer a single question:

> "What is appropriate to do in this place?"

What is appropriate for one person to do here (in this place)?

In a more elaborate form, the question can use several different verbs that span quite a range of options: "What kinds of things are people required, expected, encouraged, allowed, tolerated, discouraged, forbidden, or unable to do here?" The answer may depend on any of the factors that help make a particular place what it is -- in other words, on any of the *site* conditions or *situation* links that have an influence on the nature of the place.

site and situation --

two parts of the concept of location

(Chapters 4, 5, and 8)

At a community, national, or global scale, the result of answering the basic geographical question is more than just the sum of the individual choices. The geographic goal of a community is to locate things -- roads, stores, clinics, schools, etc. -- so that the result is not only beneficial for individuals, but also safe, fair, efficient, and beautiful for others.

tragedy of a commons --

What is appropriate for one individual may not be so for many.

When we study how to make those choices, however, we soon run into something that people in many disciplines have noted. Ecologists call it "the tragedy of the commons." Economists call it "the paradox of the aggregate." Other disciplines have their own names for the same basic idea: *something that is good for one individual may be bad if too many do it.* For example,

> If there is only one cow in a pasture, it can get all it wants to eat. If there are too many cows, the pasture is likely to be overgrazed. The grasses may give way to weeds, and all of the cows suffer.

If there is only one billboard on a road, it stands out, draws attention, and can convey its message. If there are too many signs, individual billboards get lost in the clutter and fail to communicate.

If there is only one cabin on a lake, it is quiet, with a great view and clean water. If there are too many cabins, the result is likely to be a lot of noise, a cluttered view, and polluted water.

In short, there is a right amount of anything for a given place.

This is the basis for one extremely important form of applied geography -- choosing locations for stores, roads, factories, and other human activities and structures. Owners of a video-rental chain, for example, can study maps in order to decide how many new stores are needed and where they should be located (Figures 9A and 9B).

Location analysis -- deciding how many things to put in a place and where to put them

At a simplistic level, one might just look for gaps in the pattern of existing stores. A more advanced kind of **location analysis** might consider other variables such as population density or per-capita income. A still more elaborate study would include an analysis of travel time and road congestion.

We could continue adding variables to this list to show how geographical analysis is an open-ended process, with ever more sophisticated levels of inquiry. This book, however, is about teaching geography, not doing it. Why are we taking this detour into the dilemma of the aggregate?

Because there is also a right amount of any given approach to teaching.

You know the buzzwords: checklist, learner outcome, Socratic approach, Binko method, storyboard, individualization, case study, simulation, CAI unit, cooperative learning, and so forth. Whatever the fad, it probably has a persuasive guru with plenty of amazing personal experience being wildly successful using the approach all over the world.

The need for variety in a classroom

Like a single cabin on a lake, almost any teaching method works well for its first user (at least for awhile). Classroom teachers, however, know that different students need different approaches on different days. Variety is necessary, if for no other reason than to make today something other than a monotonously predictable continuation of yesterday. At the same time, students need a certain degree of familiarity and predictability, so that they can develop a sense of mastery. This balance is complicated by the fact that the desirable level of predictability varies from one student to another, one day to another, one term to another.

How do teachers find a happy medium along this continuum from monotony to excessive variety? That is the challenge of teaching. It is why teachers should view education gurus with a healthy mix of appreciation and skepticism. Educational research does provide interesting insights. Teachers should always be experimenting with better ways of getting ideas across. In the last analysis, however, there is no single method that works for all students all the time.

The best approaches are the ones that get students to learn to the best of their ability. Those approaches, however, have to be tailored to the kind of students a specific teacher encounters on a given day.

The selection of teaching approaches thus depends on the abilities, background, and preferences of an individual teacher. The choice also depends on the nature of the students. It depends on the time and place. Finally, it depends on how well various approaches can contribute to specific learner outcomes. The purpose of this book was to explore a range of options and to fit them into a perspective on the unique nature of geographical teaching. That exploration can be summarized in one final question:

What should we use as unit titles in a geography class?

Whatever lets us get our themes across most effectively.

Geographical theme -- idea that permeates a discussion and helps define what is important (see Chapter 5)

Throughout this book, we have suggested that using geographical themes or skills as unit titles is not desirable. The undesirability stems from the fact that geographic themes, skills, and approaches resemble the working of a scissors. They have multiple blades that cooperate with each other to cut through the complexity of the world and to isolate useful principles.

This can be illustrated with one final case study. To show how the analytical blades of geography can work almost anywhere, I propose to focus attention on one of the most boring-looking landscapes in the United States. (If nothing else, it gives me one last chance to underscore the idea that geography is about all places, not just the rich and spectacular).

Let us, then, take a drive across the Maumee lake plain, a numbingly flat expanse of cropland in northwestern Ohio. The tall corn suggests that this land is exceptionally fertile. Meanwhile, long, straight, deep ditches along the road and across the fields imply that the fertility is not easy to exploit. People here had to do a lot of work to deal with the land's apparent tendency to remain unworkably wet for long periods of time. Someone who knows about the annual cycle of temperature and precipitation would rightly speculate that the worst period is probably right after the spring snowmelt.

Human-environment interactions, location, site, movement, region -- central "themes" of geography (see chapters 4 and 5)

> [That short paragraph already notes several **interacting** facts from the physical and human geography of the region: its flat terrain, fertile soil, snowy winters, and accessible location. After all, who would bother to dig deep drainage ditches if the soil were infertile or the fields were too far from potential markets for corn? Each of those facts about this **region** is basically a statement of a **site** condition that occurs as a result of the **movement** of airmasses, water, tractors, and grain trucks from one **location** to another.]

The farmhouses in this area are smaller and younger than those on the hillier land both east and west of the lake plain. The frontier of European settlement swept past this area in the early 1800s (Figure 3M). Actual occupation of the lake plain, however, was delayed until some German immigrants came in the middle to late 1800s. These people from the north European plain had the skills, community organization, and work ethic needed to dig ditches and install tile lines across several hundred square miles of wet clay soil. By that time, however, the network of roads and railroads had matured to the point that families did not view their farmstead as the center of their lives. As a result, the houses are more modest than the tall Federalist and Italianate "mansions" one sees on farms in other parts of Ohio and Indiana.

All of this is background for a puzzle that forms this case study.

Why build a boat dock on an ugly little square pond?

As you drive across the lake plain, you might notice a small pond or lake near some of the freeway interchanges. Look closely at one of the ponds. It is probably square or rectangular, not a very natural-looking shape. You might also see some mobile homes or sheds near the banks, maybe even a boat dock or two.

We can use the puzzle of these boats docks to show how all of the analytical blades of geography come into play. Why would people build boat docks, beaches, and even water-ski ramps on artificial ponds not much bigger than a football field? Looking for the answer to this question makes you think about many different consequences of the flatness of the terrain.

What are some of those logical consequences of flatness?

1) The entire area looks like a shallow lake in spring, before the water from melting snow can drain away or evaporate. (This deceptively simple sentence actually draws on information from thematic maps of terrain, precipitation, and temperature. In other words, mental maps of climate and the former locations of Ice-Age lakes can help someone interpret a local view from a car window in northwestern Ohio. (See Figures 3I, 3K, and 9C. Better yet, lay them on top of each other to make the relationships clearer).

Thematic map --

shows the arrangement of a specific thing in a large area

(see Chapter 2)

2) By late summer, the area looks just like a huge flat farm field. One can reasonably assume that it has all of the exciting recreational opportunities associated with huge flat fields. (That is a geographic **fact**, but it is also a **value judgment** for many people).

Image, theory, evaluation --

multiple strands of meaning

(see Chapter 3)

3) Interstate highways are supposed to go over or under other roads, rather than meet them at a stoplight or uncontrolled intersection. (The purpose of this rather expensive kind of **infrastructure** is to promote rapid movement of people and goods. That helps connect places with the world economy, which in turn can make land near the highway exits more useful and valuable.)

Infrastructure --

roads and other features built to facilitate links between places

(see Chapter 4)

4) Digging a tunnel under another road is not wise in a place where spring floods cover the flat land. Road underpasses are likely to fill with water unless they are pumped out. Moreover, there is really nowhere to pump excess water on this flat land.

5) A bridge is the answer. To get enough dirt to raise the highway, engineers have to "borrow" dirt from nearby fields. Since those fields are pool-table flat, the borrowing inevitably leaves a pit.

6) The pit fills with water. That is hardly a surprise -- water cannot flow across the flat land, and it cannot drain downward through the sticky clay soil. It has nowhere else to go.

7) Finally, even a small area of open water is better than none in an area that has few recreational options. For that reason, people make use of the "resource" created by the highway engineers. To do this, they build vacation homes, boat docks, water-ski ramps, and other water-sports features on the tiny ponds. You can see those features from a car window. They are also visible on reference maps of local areas (Figure 9D).

Reference map --

shows the locations of a variety of things in a specific area

(see Chapter 2)

These small rectangular ponds thus can be viewed as the landscape consequences of reasonable human responses to the environmental conditions in a particular location.

The same word can mean different things in different places

(see Chapter 3)

These ponds also provide one last illustration of another basic geographic principle: the same words can mean different things in different regions. Despite the ingenuity of the people who built water-ski ramps on the ponds, there is no way that "beach" can mean exactly the same thing here as it does in Daytona, Florida.

People use the little Ohio ponds for swimming and sunbathing only because Daytona is too far away for easy commuting after school or work. (That is yet another geographical principle in action -- the cost of overcoming distance has an obvious effect on behavior, because it exerts a financial penalty on anyone who would try to visit a Florida Beach too often from Ohio.)

In short, geography matters. It has an influence on what people can do in a place, and on where they choose to do particular things. If we can illustrate that principle in the "boring" flat lake plain of northwest Ohio, we can apply it in practically any environment on earth.

People with a good stock of knowledge about other places also have a solid basis to judge proposals for doing specific things in the place where they live. As we said in Chapter 1, geography is the art and science of knowing why something we know for sure in one location may be wrong there in another.

The flip side of that coin is that geography is the art and science that can help us understand why people do what they do in other places. This understanding can then guide us in choosing the best of those ideas and applying them to help solve problems where we are. (Or, even if we conclude that we cannot use an idea, we can at least appreciate how other people solved some of the problems they encounter where they live.)

One more thing: you do not have to worry much about graffiti in northwest Ohio. Marks on bridges do not carry nearly as many ominous meanings there as in parts of Los Angeles. That is not a bad tradeoff for someone growing up in a place where the word "beach" means fifty feet of muddy sand on a tiny square pond. The simple fact is that places are different, and different kinds of behavior are appropriate in different places. The study of geography is the way in which human beings organize and communicate this information to each other.

As they say in Minnesota, that's not such a bad deal.
You betcha.

SOURCES OF LOCAL GEOGRAPHIC INFORMATION

c. 1996, Darrell Napton
South Dakota State University

This guide is a tool to help you find local information. The list is not comprehensive, but is to give you some starting points on your search. The information available will differ from community to community. The premise of this guide is that you will generally find the information that you want if you ask the right PEOPLE, find the right PUBLICATIONS, and look in the right PLACES. This three pronged approach will help you find information that you never knew existed. Sometimes you will be fortunate and find the information that you seek on the first phone call or visit to an office. Other times a more extensive search will be necessary. Enjoy your search!

PEOPLE WHO CAN HELP YOU: FINDING EXPERTS

Agricultural Stabilization and Conservation Service county employees often are experts in rural geography. Listed under United States Government, Department of Agriculture, this agency administers farm commodity, conservation, and disaster programs.

Members or officers of associations, from the Archaeology Society to the Zoo Associates. Americans like to join organizations, which often have expert employees. Many states publish a directory of assocations; check your local library to see if your state has one.

Chamber of Commerce employees or volunteers are community experts who may be able to assist you or direct you to other local experts.

City, county, and regional planners are professionals whose job is to be knowledgeable about local geography, to keep abreast of changes, and to help the community plan and adapt to the changes. The data they collect and use are normally available to the public.

League of Women Voters often publishes special reports on specific local issues.

Librarians try to link patrons with the information that they need. There may not be a published guide to local experts, but an experienced librarian has tremendous knowledge about who knows what and would be willing to share it.

Newspaper reporters try to find experts to interview for their articles. Veteran reporters become local experts and may share their insight with a curious geographer.

Political lobbies, from Bread for the World to the National Rifle Association, often have local members who are willing to work with teachers or students.

Real Estate professionals make their living from knowing what appeals to home buyers. An experienced real estate professional may know the economic and social geography of an area better than anyone else.

Natural Resource Conservation Service officials may know the physical geography of a local area better than anyone else, especially if they work in the same office for several years. Listed under U.S. Government, Department of Agriculture, in the phone book.

University faculty and Extension agents may have an intimate knowledge of the local area and may be aware of other experts and information sources that would not be available in most libraries. Extension agents are listed under county offices in the phone book.

GENERAL SOURCES

Almanac of American Politics. Biennial. National Journal, Washington, D.C. Provides a succinct geographical description and political analysis for each state and House district.

American Library Directory. New Providence, NJ: R.R. Bowker. Annual. Has information about geographic location, subject matter collected, and names of department heads.

American Statistics Index. Annual. Washington: Congressional Information Service. Has information about available statistics and a geographic index at many scales.

National Center for Health Statistics, 3700 East-West Highway, Room 1-44, Hyattsville, MD 20782; (301) 436-8952. Has an annual report that includes local and county data.

Census. Data Users Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (303) 763-4100. County and city data for agriculture, construction, energy, governments, housing, manufacturing, mining, population, retail trade, service industries, transportation, wholesale trade, and more.

City Data: A Catalog of Data Sources for Small Cities. Stephen J. Carroll, ed. 1980. The Rand Corp. This guide lists 270 sources of quality of life data for small cities.

Climates of the States. 3rd ed. 1985. Detroit: Gale Research Company. Contains an roster of climatologists and information about local climate data.

Community Researcher's Guide to Rural Data, A (revised edition). Priscilla Salant and Anita J. Waller. 1995. Island Press, Washington, DC. Describes how to get county-level census and other information.

County and City Data Book. Every 5 years. U.S. Bureau of the Census. Data on agriculture, bank deposits, business, climate, crime, electric bills, employment, government finances, health care, housing, income, population, vital statistics, and more.

County Soil Surveys. U.S. Department of Agriculture, Soil Conservation Service, and in many libraries. Local history, environment, and economy; county maps, detailed air photos, and data about crops, trees, wildlife, recreation, engineering, landscaping, and town planning.

Current Geographical Publications: Additions to the Research Catalogue. Milwaukee: University of Wisconsin-Milwaukee, American Geographical Society Collection. Lists articles by region and state as well as by topic. Ten issues per year.

Directory of Federal Statistics for Local Areas: A Guide to Sources. 1978.

Encyclopedia of Associations: Regional, State, and Local Organizations. Susan B. Martin, ed. First edition 1988-89. Detroit: Gale Research Inc. This multi-volume guide lists name, address, and phone number of a contact person for about 50,000 nonprofit organizations.

Encyclopedia of Geographic Information Sources: U.S. Volume. Gale Research Company: Detroit. Lists over eleven thousand publications and agencies; sections devoted to the entire nation, each state, and over three hundred cities and regions.

Federal Depository Libraries. The federal government is the world's largest publisher; it stores documents in about 1400 Federal Depository Libraries. Contact your local library or the Federal Depository Libraries, Office of the Public Printer, Washington, DC 20401.

Flying the Colors Series. Irregular. Clements Research, Inc. State summaries (50+ pages) followed by 5-page county profiles. About half of the nation has been covered (1994).

Government Giveaways for Entrepreneurs. Matthew Lesko. 4th ed. 1994. Kensington, MD: Information USA, Inc. The first part of this book has an excellent discussion on how to get information from government experts. It also has a listing of libraries in each state.

Guide to U.S. Government Statistics. Documents Index, Inc., McLean, VA.

Historical Statistics of the United States: Colonial Times to 1970. Washington, D.C.: U.S. Government Printing Office. A two volume compilation from the U.S. Statistical Abstract. Though its tables seldom focus on local areas, this is an invaluable guide to the historical geography of the U.S. Its list of sources may lead you to the information that you need.

Lesko's Info-Power II. Matthew Lesko. 2 ed., 1994. Detroit: Visible Ink Press. If you own only one guide to information, this is the one to have; it lists over 8,000 topical experts who may be able to guide you to a local source or an expert in your community.

The Library of Congress. Washington, D.C. Also, check to see if your state of interest has a state list of publications. State Executive Directory. Carroll Publishing Company, 1058 Thomas Jefferson Street NW, Washington, DC 20007; (202) 333-8620.

The National Directory of State Agencies. Washington, DC: Information Resources Press.

Places Rated Almanac. Boyer and Savageau, Prentice Hall, Inc. (See Places Rating section).

Rand McNally Commercial Atlas and Marketing Guide. Annual. Chicago: Rand McNally and Company. National maps with county data, and state maps of topics such as population change, manufacturing, trading areas, railroads, college population, 3 digit zip code.

Region and Regionalism in the United States: A Sourcebook for the Humanities and Social Sciences. 1988. New York: Garland Publishing Co.

State Administrative Officials Classified by Functions. Council of State Governments, 3560 Iron Works Pike, P.O. Box 11910, Lexington, KY 40578; (606) 231-1939.

State and Local Statistics Sources. 1993 (or most recent). M. Balachandran and S. Balachandran, eds. Detroit: Gale Research. 1912 pp. This book provides a subject guide to statistical data on states, cities, and locales, with an annotated list of sources. Appendix A contains an annotated bibliography of nonprint sources of statistics, specifically data bases and data centers not included in the main body of the text.

State and Metropolitan Area Data Book. U.S. Bureau of the Census. Provides state, metropolitan, central city, and 738 component county statistics.

State Bibliography. Varying coverage, quality, and publisher. For example, the Bibliography of Missouri Geography (Walter A. Schroeder. 1977. University of Missouri-Columbia Extension Division) is narrowly defined for geography, while South Dakota: Changing, Changeless (Sue Laubersheimer, South Dakota Library Association) is quite broad.

State Data and Database Finder. Irregular. Kensington, MD: Information USA, Inc. Includes a description of databases maintained by state agencies.

State Executive Directory. Carroll Publishing Company, 1058 Thomas Jefferson Street NW, Washington, DC 20007; (202) 333-8620.

State handbooks and almanacs. These non-official, privately published publications range from tourist narrations to elaborate compilations of county and local data. The Texas Almanac published by the Dallas Morning News is one of the best examples.

State statistical abstracts. For a complete list see the statistical abstract appendix of the Statistical Abstract of the United States.

State Yellow Book: Who's Who in the Executive and Legislative Branches of the 50 State Governments. Monitor Publishing Company, 104 Fifth Avenue, New York, NY 10011; (212) 627-4140 Semiannual. Addresses and phone numbers for state personnel, as well as a list of intergovernmental organizations and a subject index.

Statistical Abstract of the United States. Annual. Government Printing Office. About 1,400 tables of data with sources listed. Often one can call the source and locate an expert on the particular topic. An appendix lists all state statistical abstracts.

Topographic Maps. United States Geological Survey (USGS). The experienced user can glean much from these maps. See the Maps section for more information.

Travel Guides. Well-written reference books and travel guides (e.g. Fodors, AAA) are often the best introduction to a region with which you are unfamiliar.

Who Knows: A Guide to Government Experts. Irregular. Washington Researchers Publishing. This publication has a specific subject index.

World Chamber of Commerce Directory. Annual. Loveland, CO. Local chambers, economic development agencies, and tourist bureaus often publish local economic profiles.

AGRICULTURE, FARMING, AND RURAL COMMUNITIES

Agricultural Statistics Board. U.S. Department of Agriculture, South Agriculture Building, Room 5809, Washington, DC 20250; (202) 720-7017. This agency collects data on all aspects of American crop and livestock production. The Agricultural Statistics Board Catalogue has a complete list of reports and contacts in the 45 field offices.

Census of Agriculture. Data User Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (301) 763-4100. This census has county level farm and agricultural data collected at five year intervals. The Graphic Summary is actually a national agricultural atlas.

Consolidated Farm Services Administration (formerly Agricultural Stabilization and Conservation Service). Information Division, P.O. Box 2425, Washington, DC 20013; (202) 720-7962, or check your telephone directory under U.S. Government, Department of Agriculture. This agency administers farm commodity, conservation, and disaster programs. There are offices in every state and most counties. The offices have information about farm programs; they also have large-scale air photos.

A Community Researcher's Guide to Rural Data. Priscilla Salant. 1990. Rural Economic Policy Program of the Aspen Institute. Washington, DC: Island Press. This guide clearly describes how to use available census publications to derive and analyze county- level census information. The text is clear and the numerous examples are useful.

Cooperative Extension Service. Look in the local phone book under county, state, or federal for your nearest office. There is a federal-state-local extension office in each of the nation's counties. Increasingly, extension service programs are targeted toward urban audiences and often deal with natural resource and quality-of-life issues.

Cooperative State Research Service. Aerospace Building, 901 D. St., SW, Washington, DC 20224 (2020 401-4268. The Cooperative State Research Service coordinates research at the State Agricultural Experiment Stations. This research has a state and often, a local orientation. Many of the results of this research are transferred to local Cooperative Extension Service offices to be made available to the public.

Natural Resources Conservation Service (formerly the Soil Conservation Service). For the nearest office, check a phone book under U.S. Government, Department of Agriculture. Some of the staff may be experts in local resource issues. The office may also have satellite photos or detailed maps of local areas, as well as a local county soil survey. Most surveys include brief discussions of the county's history, geology, environment, climate, and economic conditions. Surveys also include one or more county maps, detailed air photographs with soils information overlaid on them, and various tables and text descriptions that provide information about the usefulness of each soil in the county to support crops and pasture, range land, recreation, engineering, gardening and landscaping, and town and country planning.

State Agricultural Experiment Stations. Contact Cooperative State Research Service, Aerospace Bldg., 901 D. St., SW, Washington, DC 20224. Experiment Stations are located at land grant universities and conduct agricultural, natural resource, and rural community research in each state. The variety of research is amazing; some of it may apply to your area and much of it is not directly agricultural.

State agricultural office addresses. These are available from Lesko's Info Power (2 ed., 1994, Matthew Lesko. Detroit: Visible Ink Press) or the State Yellow Book (see the Finding Experts section).

State Land Grant University or College. Each state has one or more universities affiliated with the Federal Land Grant program. These universities normally issue a variety of agricultural and natural resource publications at a variety of geographic scales. These publications range from simple to technical. The focus is generally farming, natural resources, or rural communities. County Extension offices stock some publications. For additional information, contact the land grant university reference librarian.

BUSINESS AND ECONOMIC INFORMATION

Business directories. Commercial firms often publish lists of local businesses. For example American Business Directories (P.O. Box 27347, Omaha, NE 68127; (402) 593-4600) publishes the South Dakota Business Directory, which lists businesses by city and yellow-page category, manufacturers by city and SIC code, major employers and publicly-traded companies, and business counts by county and 3-digit ZIP code.

Business Research Centers. Many businesses have affiliated research centers that conduct various economic research. The research reports often contain recent county demographic and economic estimates. For example, the University of Texas at Austin, Bureau of Business Research published the Atlas of Texas (1976).

County Business Patterns. U.S. Bureau of the Census. Annual. Just what the title implies: data on business activity in each county, organized by state.

Editor & Publisher Market Guide. New York: Editor and Publisher. An annual assessment of the demographics, retail sales, and accessibility of each daily newspaper market area in the nation.

Employment & Earnings Statistics for States & Areas. U.S. Bureau of Labor Statistics.

Financial Disclosure Group, Federal Deposit Insurance Corporation (FDIC), 550 17th St., NW, Room F-518, Washington, DC 20429; (800) 843-1669. This agency can provide data on bank assets and deposits in a county or metropolitan area.

Local Area Personal Income. U.S. Bureau of Economic Analysis. Annual. Published by the Government Printing Office, Washington, DC.

Local Economic Development Office. These offices have information they use to persuade businesses to move to the community. For a listing of local economic development offices see the World Chamber of Commerce Directory (annual, Loveland, CO).

Rand McNally Commercial Atlas and Marketing Guide. Annual. Chicago: Rand McNally and Company. This standard reference provides several national maps with county level data, large scale state maps, and extensive economic and population information.

Regional Economic Forecast Analysis Division, Bureau of Economic Analysis (BEA), U.S. Department of Commerce, 1401 K St., NW, Room 308, Washington DC 20230; (202) 523-0946. Provides economic analyses and projections by county, MSA, state, and region.

Regional Federal Reserve Bank. Each regional federal reserve bank issues both periodic and irregular reports on the region's economy. Few of these will focus on local regions, except for major metropolitan areas, but they provide an up-to-date regional context. For a list of addresses contact your library or see Lesko's Info-Power II (2 ed., 1994, Matthew Lesko. Detroit: Visible Ink Press).

Sales and Marketing Management. The Jul/Aug and Oct/Nov issues of this respected magazine have estimates of population, retail trends, and local "buying power."

State company directories. Most state offices of economic development or chambers of commerce publish directories of firms. These vary in sophistication, but they usually have a geographical index, SIC code, names and addresses, market area, and employment data.

State Economic Development Office. For a list of offices and their publications, see Government Giveaways for Entrepreneurs 4th ed. (Matthew Lesko. 1994. Kensington, MD: Information USA, Inc.) Information gathered by these offices varies from state to state; it might include employment in various SIC codes, reports on the hotel industry by city, demographic projections of each city and county, and occupations by city and county.

State Offices. These offices vary from providing little information to providing a great deal. Most will provide asset information by bank. These offices generally collect information about all types of lending institutions in the state.

Telephone Yellow Pages. These can be surprisingly useful sources of information about the economic structure of a local area (especially the CD-ROM versions, which allow you to count industries of particular kinds in particular areas).

Year Book: The Encyclopedia of the Newspaper Industry. New York: Editor & Publisher. An annual publication that provides information about every newspaper in the nation.

CENSUS INFORMATION

State Data Centers. These centers furnish data products and technical assistance. There is at least one center in each state; most states have more than one. To obtain information or a current list of centers, contact the Data User Services Division, Customer Services, Bureau of the Census, Washington, DC 20233-8300, (301) 763-4100.

U.S. Census Bureau. Data Users Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (303) 763-4100. The breadth and depth of Census Bureau publications cannot be easily summarized. Many of the Bureau's products provide county and city data for agriculture, construction, energy, governments, housing, manufacturers, minerals industries, population, retail trade, services industries, transportation, wholesale trade, and more. The Census bureau also publishes a variety of maps including county maps that show county subdivisions and U.S. and state maps that show county (or equivalent) subdivisions.

Census Catalog and Guide. Annual. Data User Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (301) 763-4100. Data for Communities. U.S. Bureau of the Census Factfinder for the Nation series. Number 22. Data User Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (301) 763-4100. Census 80: Continuing the Factfinder Tradition. U.S. Census Bureau. Chapter 13, "The Use of the Census of Population and Housing by Geographers," provides information about using census information to learn more about local areas.

COASTAL AREAS

National Sea Grant College Program. Office of Oceanic Research Programs, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1335 East-West Hwy., Silver Spring, MD 20910; (301) 713-2465. The National Sea Grant program links the federal government with over 300 participating colleges, universities, and research organizations to conduct coastal, oceanic, and Great Lakes research.

National Sea Grant Depository. Pell Library Building, University of Rhode Island, Bay Campus, Narragansett, RI 02882; (401) 792-6114. This is a clearinghouse for all Sea Grant research publications. The library staff will conduct on-line searches to find the material that you need.

Office of Marine Safety, Security, and Environmental Protection, U.S. Coast Guard, U.S. Department of Transportation, 2100 2nd St., SW, Room 2104, Washington, DC 20593-0001; (202) 267-0518. This office has environmental information, especially in the Pollution Response Branch and the Office of Marine Environmental Response

Office of Oceanography and Marine Assessments, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 6001 Executive Blvd., Rockville, MD 20852; (301) 443-8487.

Marine Debris: Status Report and Bibliography. Available free from the National Ocean Service, Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration (NOAA), 1825 Connecticut Ave., NW, Room 724, Washington, DC 20235; (202) 606-4158. This bibliography includes state documents.

DISSERTATIONS, THESES, OTHER UNIVERSITY RESEARCH

University libraries often have compiled a list of theses and dissertations completed on their campus; many of these deal with local issues. Departments also maintain lists of major research papers, theses, and dissertations completed by their students.

Bibliography of Dissertations in Geography on Anglo-America, 1962-1972. A. Dean R. Hodson. 1974. Monticello, IL: Council of Planning Librarians, Exchange Bibliography, no. 583-584. This bibliography arranges its entries by region.

Bibliography of Master's Theses in Geography: American and Canadian Universities. Merrill M. Stuart. 1973. Tualatin, OR: Geographic and Area Studies Publications. This bibliography has a regional index.

Comprehensive Dissertation Index. Annual. Ann Arbor, MI: University Microfilms International. This is an index based upon disciplines and key words in titles. For instance, in the "Geography and Regional Planning" chapter one could look for Denver to find any dissertations that had Denver in the title. Physical and human geography are in different volumes.

National Faculty Directory (Three volumes). Annual. Detroit: Gale Research, Inc. An alphabetical listing of teaching faculty members at junior colleges, colleges, and universities. If you know the name of a faculty member, this directory will provide that person's current affiliation and address.

ENERGY

Electric Power Data. Electric Power Division, Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration, U.S. Department of Energy (DOE), 1707 H Street, NW, Washington, DC 20585; (202) 254-5419.

Energy Information Administration Publications Directory: A Users Guide. National Energy Information Center, Energy Information Administration, U.S. Department of Energy (DOE), 1000 Independence Ave., SW, Room E1-231, Washington, DC 20585; (202) 586-8800. The National Energy Information Center is the focal point for U.S. Department of Energy publications.

Energy Information Directory. National Energy Information Center, Energy Information Administration, U.S. Department of Energy (DOE), 1000 Independence Ave., SW, Room E1-231, Washington, DC 20585; (202) 586-8800.

Energy Use Data. Office of Energy Markets and End Use, Energy End Use Division, Energy Information Administration, U.S. Department of Energy (DOE), 1000 Independence Ave., SW, Room 2F-065, Washington, DC 20585; (202) 586-1122. This agency conducts research on regional energy uses and demographic breakdowns. Call or write for more information.

Rural Electrification Administration. U.S. Department of Agriculture (USDA), Room 4051, Washington, DC 20250; (202) 720-952. This agency lends money to the 1,000 rural electric cooperatives. They can provide a list of local cooperatives. These utilities may have histories, annual reports, and planning documents that will provide local information.

Solar and Wind Energy. National Climatic Data Center, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Federal Building Asheville, NC 28801; (704) 259-0682. This is the place to obtain sun and wind data.

State Energy Offices. For a complete list see Lesko's Info-Power II 2 ed., 1994. Matthew Lesko. Detroit: Visible Ink Press.

Utilities. Electricity companies are publicly regulated and many are publicly owned. This means that a vast quantity of information is available in the form of annual reports, planning documents, and proposals to change rates.

ENVIRONMENT, RESOURCES, AND PHYSICAL GEOGRAPHY

ACCESS EPA, 401 M Street, SW., PM-211B, Washington, DC 20460; (202) 260-5922. This publication provides information about gaining access to all Environmental Protection Agency publications, libraries, data bases, and information services.

Climates of the States. 3rd ed. 1985. Detroit: Gale Research Company. This major, two volume book provides extensive climate information for states and local areas. The information is from the National Oceanic and Atmospheric Administration and includes a 3-5 page narrative of the climatic conditions for each state, maps of the weather stations and substations in each state, maps of temperature and precipitation for each state, tables of climatic data for each weather station and substation, a guide to federal information sources in weather and climate, and an overview of state climatologist programs.

Climatological Data: (your state). The title and issuing agency have varied over the years; the current one is National Climatic Data Center (NCDC), National Environmental Satellite, Data and Information Service, U.S. Department of Commerce, Federal Building, Asheville, NC 28801; (704) 259-0682. This is the world's largest climate data center. The staff can answer some questions over the phone and will provide a list of data.

Endangered Species of North America, The Official World Wildlife Fund Guide to,. 1990. John R. Matthews and Charles J. Moseley, eds. Washington, D.C.: Beacham Publishing, Inc. A multi-volume guide that provides two pages of information about each endangered plant and animal species in North America, including a location map and a bibliography.

Environmental Impact Statements (EIS). Special Programs and Analysis Division, Office of Federal Activities, Environmental Protection Agency (EPA), 401 M St., SW, Room 2119, Washington, DC 20460. Also, depending upon your region, contact the Army Corps of Engineers, Bureau of Reclamation, Bureau of Land Management, Federal Energy Administration, Forest Service, National Park Service, or your state natural resource department or governor's office. An EIS must be prepared when any project with federal funding or interstate scope may alter the environment. The purpose is to insure that promoters of the project consider all relevant information and try to minimize environmental damage. A good EIS can be a treasure trove of local geographic sources and information, but some were done sloppily, and some were conducted to reach a predetermined conclusion. An EIS has several sections of interest to geographers:

1) A discussion of the environmental, cultural, and economic conditions of the site and possible changed conditions based upon alternative courses of action.

2) A list of federal, state, and local agencies, tribal governments, organizations, businesses, and individuals who testified or were consulted -- concerned folks; many are experts with access to local information.

3) An extensive bibliography, much of it on local geographical topics.

4) Specific site maps and maps of general environmental and economic conditions.

Finding the Environmental Data You Need. National Environmental Data Clearinghouse. NEDRES Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1825 Connecticut Ave., NW, Room 412, Washington, DC 20235 (202) 673-5548. A clearinghouse for environmental data sets.

Hydrologic Information Unit (HIU). Water Resources Division, U.S. Geological Survey, National Center, MS 419, Reston, VA 22092; (703) 648-6817. Provides general water information, answers to questions, and referrals to other offices when necessary.

Mining and Geology Schools and Agencies. State geological surveys, bureaus of mining, and schools related to mining and geology often publish maps and information guides to the geology and natural resources of local areas. The New Mexico Institute of Mining & Technology (Socorro, NM), for instance, publishes a series of nontechnical guides that include climatic, historical, and land use information along with a geological focus.

National Environmental Data Referral Service. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 1825 Connecticut Ave., NW, Room 412, Washington, DC 20235; (202) 606-4548. Provides a database of climatic databases. Publishes the North American Climatic Data Catalog.

Nature Conservancy. 1815 North Lynn St., Arlington VA 22209; (703) 841-1283. Has a national data base of plants and animals and their distributions.

Rolling Rivers: An Encyclopedia of America's Rivers. 1984. Richard A Bartlett, ed. New York: McGraw-Hill Company. Brief (3-4 page) essays on 125 U.S. rivers. Each essay provides sources for additional information. The focus, however, is on history more than environment.

Roadside Geology of (your state). Mountain Press Publishing Company P.O. Box 2399, Missoula, Montana 59806. Each volume provides an introduction to the state and describes in words, maps, diagrams, and photographs, the geological features along selected roads. Each volume also contains a bibliography. Nearly half of the states have been covered.

Soil Survey of (your county). Provides detailed information about soils, slope, drainage, wildlife, farm ponds, and more. A typical soil survey includes a synopsis of information about the local climate, geology, historical land uses, land use changes, and economy of the county. Soil information provided includes information about the ability of each soil to be used for a variety of purposes including crops, housing, roads, septic systems, and wildlife. To obtain a copy contact your local Soil Conservation Service office. The local office may also have copies of satellite photos and detailed maps drawn for local projects.

State Agricultural Experiment Stations. These research units connected with each state land grant university often produce local and state climate profiles, hydrological analyses, and other research related to a state's natural resource base.

State departments of agriculture, energy, fish and wildlife, geology, health, mining, natural resources, parks and recreation, water. (See Places to Look section, State Government heading for information on locating these offices).

State Environmental Libraries. Most states have a state environmental library that is supported by the EPA to assist in sharing environmental information between the EPA and the states. Other states do not have an environmental library, but are willing to provide environmental information upon request. For a complete listing contact the EPA Information Access Branch, Information

Management and Services Division, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460.

State Geological Offices. Most states have an agency that conducts some geological research and cooperates with the U.S. Geological Survey. These offices often sell U.S.G.S. publications and may have a state-oriented earth sciences library. For a complete list see Lesko's Info-Power II (2 ed, 1994, Matthew Lesko. Detroit: Visible Ink Press).

The Truth About Where You Live: An Atlas for Action on Toxins and Mortality. Benjamin A. Goldman, 1991. New York: Random House. A national atlas with county data, extensive text, a partially annotated bibliography, and a list of concerned organizations.

U.S. Geological Survey: Earth Science Information Center. 507 National Center, Reston, VA 22092; (800) 872-6277. This is the first stop to learn about maps, reports, air photos, satellite imagery, and other geological and earth-science information. The office can provide you with a list of regional centers. Another route to the same agency is through the Public Inquiries Office, 503 National Center, Room 1-C-402, 12201 Sunrise Valley Dr., Reston, VA 22092; (703) 648-6892. This office assists the public in finding the appropriate topographic, geologic and water resource maps and reports. The office also provides catalogs and bibliographies, conducts reference searches, and provides a contact with state and other federal offices.

U.S. List of Endangered and Threatened Wildlife and Plants. Office of Endangered Species, U.S. Fish and Wildlife Service, 4401 N. Fairfax Dr., Arlington, VA 22203; (703) 358-2171.

Water Data Exchange (NAWDEX). Water Resources Division, U.S. Geological Survey, National Center, MS 421, Reston, VA 22092; (703) 648-5677. A division office in each state provides the public with water information and answer water questions for that state. Types of information include surface water resources, water supply and use, ground water quality and resources. The state centers also publish a calendar of water-related activities for the state. Contact the Washington office for assistance and for a list of the state centers.

Weather Almanac, The. Detroit: Gale Research, Inc. Provides information and data on weather, climate, and air quality for U.S. cities. The wide variety of weather and climate related information makes up for the limited geographic focus upon cities.

Weather Handbook, The. McKinley Conway and Linda L. Liston eds. 1990. This book provides a summary of climate and weather for selected U.S. and world cities.

ETHNICITY AND CULTURAL GEOGRAPHY

Atlas of the North American Indian. 1985. Carl Waldman. New York: Facts on File Publications. A well-researched black-and-white atlas of homelands.

Atlas of Religious Change in America: 1952-1990. 1994. Peter L. Halvorson and William M. Newman. Atlanta: Glenmary Research Center. This beautiful atlas presents denomination information at the county level.

Encyclopedia of American Religions 4th ed. 1993. J. Gordon Melton. Detroit: Gale Research, Inc. Essays and directory listings for religious groups in the U.S.

The Native North American Almanac. 1994. Duane Champagne, ed. Detroit: Gale Research Inc.

Peoples of the World: North Americans. 1991. Joyce Moss and George Wilson. Detroit: Gale Research, Inc. This book covers "the culture, geographical setting, and historical background of 37 North American peoples." This eclectic mix ranges from information about ancient Americans (Anasazi) to religious (Quaker), and ethnic groups (Polish American).

Statistical Record of Native North Americans 2nd ed. 1995. Marlita A. Reedy, Ed. Detroit: Gale Research Inc. Nearly 1,000 tables of information about Native Americans. Includes a ten page source listing.

We the People: An Atlas of America's Ethnic Diversity. James Paul Allen and Eugene James Turner. 1988. New York: Macmillan Publishing Company. This beautiful atlas depicts the ethnic history and diversity of America. Numerous national maps show county level data for the 1980 census. Historical maps show a variety of ethnic groups at various times in the nation's history. The appendix shows the number of persons from each ethnic group for each county in 1980. The bibliography is extensive.

HISTORY AND HOUSING

Church histories and other Anniversary (e.g. centennial) publications. These documents may provide an insight into patterns of ethnic settlement and migration and other facets of a community's changing face.

Hospital and nursing home plans and histories. These documents may provide insight into the community's past or future.

Local, city, county, and state museums and historical societies.

The Census Bureau releases original census documents 100 years after they are collected. These may provide insight into a community's historical geography.

Voluntary Organizations. Fraternal organizations and volunteer societies often publish histories of their activities.

American History Source Book. Joel Makower, ed. 1988. Prentice Hall Press, New York. This geographically organized (by state) guide to 3,000 historical organizations and collections also includes an extensive bibliography.

American Housing Survey. Census Bureau. Provides county and metropolitan data from samples on housing characteristics, and neighborhood quality, financial characteristics, households that have moved and energy characteristics. This survey provides more housing information than the census, but focuses on selected urban areas.

Bibliography of American County Histories, A. P. William Filby, compiler. 1985. Baltimore: Genealogical Publishing Co., Inc. List of county histories, which may be available in local or state libraries; sometimes these are in manuscript or private printed form.

Census of Housing. Census Bureau. Contains data on housing characteristics by local area, census tract, and city block.

Directory of Historical Organizations in the United States and Canada. 14th ed. Mary Bray Wheeler, ed. 1990. Nashville: American Association for State and Local History. This book is issued every three years. It includes the historical and genealogical societies in the U.S. and Canada, a guide to historical organizations by state and city, a guide to state history offices, and a thematic index that lists specialized museums and associations.

Historical Atlases. Many counties have atlases that have been issued since the mid-19th century. Contact the local library or historical society.

Historic American Buildings Survey, (your state). Cambridge, England: Chadwyck-Healey.

Historical Geography of the United States: A Bibliography, Excluding Alaska and Hawaii. Douglas R. McManis. 1965. Ypsilanti: Eastern Michigan Press. Includes state and local historical society publications. Arranged by region, state, and topic.

National Register of Historic Places: (Your state). Teaneck, NJ: Chadwyck Healey. This extensive microfiche collection compiled by the U.S. National Parks Service has photographs as well as written descriptions.

Scholar's Guide to Geographical Writing on the American and Canadian Past, A. Conzen, Michael P., Thomas A. Rumney, and Graeme Wynn, 1993. Geography Research Paper 235. University of Chicago, Chicago. This remarkable bibliography may lead you to sources that you never knew existed, many at the local level.

WPA Guide to (your state). The Federal Writers' Project of the Works Progress Administration supported the publication of forty-eight state guides that have not been surpassed for their clean writing style and devotion to detail. These 1930s publications offer an intriguing contrast to the present. Each guide includes several tours of the state that often provide significant insights and details about places along the route. Many of these guides have been reissued in paperback form in recent years.

LAND OWNERSHIP AND USE

Building Inspector's records. These supplement and update the tax assessment records and may also include occupancy characteristics of buildings.

Local real estate board. Occasionally the detailed descriptions of properties put up for sale are maintained for several years. Ask for the Multiple Listing books.

Plat books. These county or township atlases provide detailed maps of land ownership. Plats are often complied and published by private firms. See the local library or county appraiser's office for information.

Tax and assessment records. State property tax board. These include data on ownership, size and type of building, property uses, assessed value, condition, recent improvements or additions, and records of recent sales.

The Real Estate Handbook. Maury Seldin, ed. Dow Jones-Irwin, Homewood, IL. See chapter 20, "Housing Market Analysis."

State offices: Association of Soil and Water Conservation Districts, Cooperative Extension Service, Fish and Wildlife Department, Parks and Recreation Department.

U.S. government offices: Army Corps of Engineers, Department of Agriculture, Soil Conservation Service, Department of Housing and Urban Development, Department of Interior, Environmental Protection Agency.

Fire Insurance Maps. Fire insurance maps depict urban land uses at various times. See the Maps and Related Tools section for more information.

Land Use and Land Cover Maps. U.S. Geological Survey, Distribution Branch, U.S. Geological Survey (USGS), Building 810, Denver Federal Center, Box 25286, Denver, CO 80225; (800) USA-MAPS.

National Resources Inventory. A national sample of land uses in each county, with results accurate at the state level. State maps show Major Land Resource Areas in each state.

LOOKING FOR YOURSELF

The most enjoyable way to learn about a local area is to go out and look. The list below only hints at the richness of the literature about all aspects of the visual (and sometimes not so visual) landscape.

Close-Up: How to Read the American City. Grady Clay. 1973. New York: Praeger Publishers.

Cultural Geography of the United States, A Revised Edition. Wilbur Zelinsky. 1992. Englewood Cliffs, NJ: Prentice Hall.

Discovering the Vernacular Landscape. John Brinckerhoff Jackson. 1984. New Haven: Yale University Press.

Interpretation of Ordinary Landscapes, The. D. W. Meinig, ed. 1979. New York: Oxford University Press.

Look of the Land, The. John Fraser Hart. 1975. Foundations of Cultural Geography Series. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Reading the Landscape of America, Revised and Expanded Edition. May Theilgaard Watts. 1975. New York: Collier Books. St. Croix

U.S. 40: Cross Section of the United States. George R. Stewart, maps by Erwin Raisz. 1953. Boston: Houghton Mifflin Company.

Literally thousands of local guides, such as Border Country. Harry Swain and Cotton Mather. 1968. Prescott, WI: Trimbelle Press.

MAPS AND RELATED TOOLS

There are many fine guides to map sources. This abbreviated listing will help you get started.

Possible local map sources including the following:
County clerk, county engineer, state highway commission, state league of municipalities, state board of water resources, state division of recreation and parks, state conservation services, state department of economic development (planning division) regional planning commission, cooperative extension service, state library and libraries of the state universities, state conservation commission, local abstract offices, and private engineering firms.

An Index to Topographic and Other Map Coverage (your state) and Catalog of Topographic and Other Published Maps (your state). Earth Science Information Center, United States Geological Survey (USGS), 507 National Center, Reston, VA 22092; (703) 648-6045. These free publications provide a current listing of USGS topographic maps.

Atlas and Gazetteer (Your State). DeLorme Mapping Company, Freeport Maine. The core of these atlases is topographic map coverage of the state (scale varies from state to state). Currently twenty-six states have been covered.

City, County and State Highway maps. Contact your city street department, county highway department, and state highway department. These maps often provide a wealth of cultural and physical information in addition to the road network.

EROS Data Center. U.S. Geological Survey (USGS), EROS Data Center, Sioux Falls, SD 57198; (605) 59-6151. The EROS Data Center is the national repository of LANDSAT satellite imagery, air photos, and space shuttle photographs.

Fire Insurance Maps. Union List of Sanborn Fire Insurance Maps Held by Institutions in the United States and Canada. Volume 1 (Alabama to Missouri). Philip Hoehn. 1976. Volume 2 (Montana to Wyoming; Canada and Mexico). William S. Peterson-Hunt and Evelyn L. Woodruff. 1977. Occasional Paper Nos. 2 and 3, Western Association of Map Libraries. Santa Cruz, CA. Historical maps of land use originally intended for fire insurance underwriting purposes. Contact a local municipal or university library to check availability. Chadwyck-Healey Inc., 623 Martense Avenue, Teaneck, MN 0766 carries microfilm versions of these maps.

Guide to U.S. Map Resources. David A. Cobb, 1990. American Library Association. Provides information about all significant map collections in the U.S. and lists Earth Science National Information Centers, state map centers, and state mapping advisory committees.

Language of Maps. National Council for Geographic Education, 1991. This supplementary manual for introductory geography and map-reading courses shows that there is more to learn about a local area from available maps than most of us thought possible.

Map Catalog: Every Kind of Map and Chart on Earth and Even Some Above It. Joel Makower, Ed. New York: Random House. This book gets bigger and better with each edition.

Map Use: Reading, Analysis, and Interpretation. Phillip C. Muehrcke. Various editions. Madison, WI: JP Publications. An informative text on how to learn more from maps.

National Cartographic Information Center. State affiliates provide assistance in finding local topographic maps, aerial photographs, and satellite information. Contact Earth Science Information Center, United States Geological Survey (USGS), 507 National Center, Reston, VA 22092; (703) 648-6045 for a list of centers.

Omni Gazetteer of the United States of America. 1991. Detroit, MI: Omnigraphics, Inc. This comprehensive eleven volume set contains information about nearly 1,500,000 places. It provides the name, location, and identification of populated places, natural features, structures, facilities, and locales. The book includes information from the United States Geological Survey, Geographic Names Information System as well as additional sources.

Sports and Recreation Atlases. These often provide detailed local information. Typical information includes public land ownership, trails, roads, and watercourses.

The Eastern Ozarks: A Geographic Interpretation of the Rolla 1:250,000 Topographic Map. Walter A. Schroeder. 1967. Special Publication Number 13, National Council for Geographic Education. Demonstrates how to the get most from a map.

U.S. Census. Data Users Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (303) 763-4100. The Census bureau publishes a variety of maps and guides to map information.

United States Geological Survey Maps. Distribution Branch, U.S.G.S., Building 810, Denver Federal Center, Box 25286, Denver, CO 80225; (800) USA-MAPS. This is the primary source for all U.S.G.S. maps, including topographic maps.

The World Map Directory. 1989 (or most recent). Aaron Maizlish and William S. Hunt. Santa Barbara: MapLink. This is a directory of in-print maps from around the world that are available in the United States.

PLACE NAMES AND RATING GUIDES.

The American Counties 3rd ed. 1972. Joseph Nathan Kane. Metuchen, NJ: The Scarecrow Press, Inc. Provides the origins of county names, dates of creation and organization, area, population, historical data, and published sources.

American Place-Names: A Concise and Selective Dictionary for the Continental United States of America. George R. Stewart. New York: Oxford University Press, 1970. Information about the origin and historical significance of 12,000 place-names.

American Places Dictionary: A Guide to 45,000 Populated Places, Natural Features, and Other Places in the United States (Four Volumes). 1994. Detroit: Omnigraphics, Inc. Brief summaries that include latitude and longitude, population, population density, population, and area in land and water for populated places including unincorporated towns and townships. Appendices include entries for American Indian Reservations, military bases, and major geographical features. Also includes a miscellany section and a selected bibliography.

Bibliography of Place Name Literature, United States and Canada. Richard B. Sealock, Margaret M. Sealock, and Margaret S. Powell. Chicago, IL: American Library Association. 1982 3rd ed. The definitive bibliography about place names.

Names & Nicknames of Places & Things. 1987. Laurence Urdang, ed. Boston, MA: G.K. Hall & Co. Just what it says!

The National Gazetteer of the United States of America. Denver: U.S. Geological Survey. A state-by-state dictionary of place and feature names.

The United States Dictionary of Places. 1988. New York: Somerset Publishers, Inc. A "national place name directory" of incorporated places. Lists name, location, population, Zip code, elevation, latitude, longitude, and sometimes origin of the name.

Writing place rating guides has turned into a cottage industry with the advent of computer data bases. Some of these guides can be useful. All must be used with care, however, because the criteria used by the author may not be the ones that are important for a particular reader. .

50 Fabulous Places to Raise Your Family. Lee Rosenberg and Saralee Rosenberg. 1993. Hawthorne, NJ: Career Press, 320 p. This guide has area profiles and discusses schools, jobs, and financial characteristics of fifty places.

50 Fabulous Places to Retire in America. Lee Rosenberg and Saralee Rosenberg. 1991. Hawthorne, NJ: Career Press. This guide covers recreation, real estate, cost of living, taxes, health care, services, safety, jobs, attractions, and transportation.

America's Top-Rated Cities: a Statistical Handbook 2nd ed. (five volumes). 1993. Rhoda Garoogian ed. Boca Raton, FL: Universal Reference Publications. This book provides economic, demographic, and other information about 71 cities, including: recent magazine articles that discussed the city, municipal finances, major businesses headquartered in the city, hotel and motel rooms, and the cost of living by category. Much of this information is not available in other guide books.

Cities of Opportunity: Finding the Best Place to Work, Live and Prosper in the 1990's and Beyond. John Tepper Marlin. 1988. National Civic League, New York: MasterMedia Limited. Focuses on job creation; quality of life; changing careers; best cities for women, minorities, and retirees; regional opportunities, and 42 "cities of opportunity."

The Livable Cities Almanac. John Tepper Marlin. 1992. New York: HarperCollins Publishers. Compares about 100 cities on economic conditions, health, air quality, water quality, crime, life expectancy, health services, and recreational opportunities. The extensive references guide the reader to local information about a variety of issues including: ground level ozone, toxic waste, cancer mortality, and accident rates.

Places Rated Almanac: Your Guide to Finding the Best Places to Live in America. Richard Boyer and David Savageau. New York: Prentice Hall. This is the oldest, most well-known, and perhaps most useful. The authors describe their methodology, have abundant maps and graphs, and best of all provide sources for their information.

Profiles of America: An Informational, Statistical, and Relocation Encyclopedia of all U.S. Cities, Towns, and Counties. 1995. Milpitas, CA: Toucan Valley Publications. This sixteen-volume set provides information about nearly 35,000 counties and county-equivalents, incorporated municipalities, census designated places, and minor civil divisions.

Rating Guide to Life in America's Fifty States. 1994. Amherst, New York: Prometheus Books. A ranking of the states, based on dozens of criteria with reasons and methodology carefully explained.

The Rating Guide to Life in America's Small Cities. Thomas G. Scott. 1990. Buffalo: Prometheus Books. This guide covers climate, the environment, economics, education, health care, housing, public safety, transportation, and proximity to urban areas.

Rating Places: A Geographer's View on Quality of Life. Susan L. Cutter. 1985. Resource Publications in Geography. Washington, DC: Association of American Geographers. Thoughtful critique of the pitfalls of rating places and discussion of the assumptions and trade-offs of any rating scheme.

Retirement Places Rated. David Savageau. 1990. New York: Prentice Hall. This book covers money matters, housing, climate, personal safety, services, working and leisure.

POPULATION, HEALTH, AND GENEALOGICAL INFORMATION

State Data Centers. Data User Services Division, Bureau of the Census, Washington, D.C. 20233-8300; (301) 763-4100. These centers furnish data and technical assistance. Each state has at least one center; most states have several. Chambers of Commerce and local Planning Offices also try to keep abreast of local population changes.

U.S. Census. Data Users Services Division, Customer Services, Bureau of the Census, U.S. Department of Commerce, Washington, DC 20233; (303) 763-4100. The Census Catalog and Guide describes all census publications and products. This is the place to start. Ask for a list of their Factfinder for the Nation series. Number 22, for instance, is Data for Communities. The Census Bureau also publishes a variety of maps.

Churches. The national offices of most churches have planning staffs that may be able to provide local socioeconomic information.

County health office. The county health office gathers information on births, deaths, and illnesses and forwards that data to the state health office.

Councils of Government (COGS) are regional, contiguous, multi-county organizations that produce regional plans and cooperate in providing some services.

Utilities. The number of customers connected to a utility (e.g. water or electricity) can often be used as a surrogate for population size and growth. Some groups or industries use more water per capita or per dollar value added than others.

Specialized proprietary firms. Today many firms specialize in obtaining, organizing, mapping, and selling demographic information. This information is usually expensive. For a snapshot of some of the firms, see Business Information: How to Find It, How to Use It, 2nd ed. Michael R. Lavin. 1992. Phoenix: Oryx Press.

Directory of Historical Societies and Agencies in the United States and Canada. American Association for State and Local History. This book is issued every three years. It lists the genealogical and historical societies in the U.S. and Canada.

American Demographics. This magazine generally focuses upon marketing geography and demography. Some of its articles are regionally oriented and some articles provide national maps with county level data mapped.

Vital Statistics of the United States. U.S. Public Health Service. The best summary of births, deaths, marriages, and divorces. The data come from county health offices via state departments. Some counties provide information directly to the public.

County and City Data Book. Census Bureau. This publication provides information by county and places of more than 2,500.

Sourcebook of Zip Code Demographics. Arlington, VA: CACI Marketing Systems, annual.

Rand McNally Commercial Atlas and Marketing Guide. Annual. Chicago: Rand McNally and Company. This standard reference provides several national maps with county level data, large scale state maps, and extensive economic and population information.

Red Book: American State, County & Town Sources revised edition. 1992. Alice Eichholz ed. Salt Lake City: Ancestry. This book was designed to assist genealogists, but many of the historical sources will be useful for anyone interested in local historical geography. Many state sections include discussions of Black American, Native American, and ethnic group research.

Sales and Marketing Management. The Jul/Aug and Oct/Nov issues of this respected magazine have estimates of population, retail trends, and local "buying power."

U.S. Metro Data Sheet. Annual. . Washington, D.C.: Population Reference Bureau. "The country's 268 largest metropolitan areas are included in this population data sheet. Indicators include population for

1980, 1990, (more recent estimates) as well as annual population change, percent black, percent Hispanic, unemployment rate, and population density.

U.S. Population Data Sheet. Annual. Washington, D.C.: Population Reference Bureau. "This state-by-state demographic portrait of the United States provided on total population, population growth, projections to 2020, population density, new AIDS cases, serious crime rates, net international and internal migration, percent minority, percent living in poverty, and other demographic indicators."

STATE INFORMATION

Bibliography of State Bibliographies, 1970-1982, A. David R. Parish. Littleton, Colorado: Libraries Unlimited, Inc.

Gale State Rankings Reporter. 1994. Gary Alampi, ed. Detroit: Gale Research, Inc. Provides a ranking of the states on about 3,000 topics including the following: general categories: demographics, education, government expenditures, taxes, arts, and leisure. There is a key-word index, location index, and listing of sources.

The Sourcebook of State Public Records. 1995. Tempe, AZ: BRB Publications, Inc. Provides an introduction to the wealth of information that can be obtained from state public records followed by a profile of each state that depicts the state offices that maintain records, how those records may be obtained, as well as well as address and phone numbers.

State Names, Seals, Flags, and Symbols: A Historical Guide. 1994. Benjamin F. Shearer and Barbara S. Shearer. Westport, CT.

State Rankings 1995: A Statistical View of the 50 United States. 1995. Kathleen O'Leary Morgan, Scott Morgan, and Neal Quitno, eds. Lawrence, KS: Morgan Quitno Press. Over five hundred tables that compare states in several areas including the following: agriculture, crime, defense, economy, education, energy, environment, geography, government, finance, health, housing, population, social welfare, and transportation.

The World Almanac of the U.S.A.. 1993 (or most recent). Allan Carpenter and Carl Provorse eds. Mahwah, NJ: Funk & Wagnalls Croporation. Seven-page textual and statistical summaries of each state.

Worldmark Encyclopedia of the States. 1995. Detroit: Gale Research, Inc. About eight pages of basic information with a short bibliography for each state.

TOURISM, TRADE, AND TRANSPORTATION

Booster Publications. These range from historic publications (often issued by the railroad) exhorting settlers to choose one community over all others, to recent publications by the Chamber of Commerce. Ask at a local planning office, or stop in the visitor's centers on Interstate Highways going into your state.

Census of Transportation. Bureau of the Census, U.S. Department of Commerce, Washington, DC 20223; (301) 763-7039.

Convention and Conference centers. Many localities have an office that produces materials to lure conventions and serve them once they arrive.

Highway Statistics. Office of Highway Information Management HPM-1, Associate Administrator for Policy, Federal Highway Administration (FHWA), U.S. Department of Transportation (DOT), 400 7th St., SW, Room 3306, Washington, DC 20590; (202) 366-0180. Provides information about regional and national travel trends, road taxes, levels of highway funding at all political levels, and a variety of other transportation data.

Local tourism board (often affiliated with the local chamber of commerce).

Motel/Hotel Guides. These guides mark the economic growth of a community. The locations of hotels and motels are chosen carefully to maximize the number of the type of customer that the particular chain wants to attract. Seasonal rate adjustments reflect the perception of increased demand at certain times of the year. These peak rate times often correspond to times of peak community economic activity, especially in tourist areas.

Real estate advertising brochures and Apartment guides provide pictures and prices of typical housing in an area. These guides can be used to get a snapshot of an area, to compare one area with another, or to compare one area at different times.

Spill Maps. Public Inquiries Section, National Transportation Safety Board (NTSB), 490 L'Enfant Plaza East, SW, Washington, DC 20594; (202) 382-6738. Provides maps of selected transportation accidents that resulted in hazardous spills.

State Department of Transportation. Traffic Counts. State highway departments, county highway departments, and city street departments often collect traffic counts.

State hotel association, restaurant association, tourism agency, vending and music association, and other public and private agencies to promote tourism; most of these produce publications to give to tourists.

World Chamber of Commerce Directory. World Chamber of Commerce Directory. Annual. Lists local tourist boards by state and town.

OTHER SOURCES

Universities and Colleges. Start with a reference librarian who has worked on the campus. The institution's directory lists research centers, special laboratories or libraries, and museums or business institutes that may have outreach programs, publications, or staff experts. Faculty are experts who can guide you to sources of local information.

Computer Indexes. Some databases are beginning to provide retrieval based upon locale.

Consulting Firms. These are usually costly, and their information is often available from other sources, but they may have expertise that is not available from other sources.

Local library. Individual librarians often become experts in local affairs or know of local experts. Ask about "vertical" files of newspaper and magazine clippings, newsletters of local organizations, special issues of the newspaper, and a variety of other items.

Research Centers. The Research Centers Directory, Detroit: Gale Research, annual, lists over 8,000 nonprofit research organizations.

FINDING INFORMATION ABOUT OTHER NATIONS

An Atlas of International Migration. 1993. Aaron Segal. East Grinstead, UK: Bowker-Saur.

Cities of the World. Detroit, MI: Gale Research Company. The heart of this four-volume set is U.S. State Department information that Gale Research has supplement with information from a variety of sources.

Demographic Yearbook. Current Year. New York: United Nations. The most recent population information about the world's nations.

Encyclopedia of Geographic Information Sources: International Volume. 4th ed. (or most recent). 1988. Jennifer Mossman, ed. Detroit, MI: Gale Research Company. This is a bibliographic guide to approximately 13,000 publications. The focus is upon English language publications. Coverage includes economic, and demographic statistics, planning documents, trade directories, local newspapers, periodicals, guidebooks, and publications that provide information for travelers.

Peoples of the World: (various regional volumes). Detroit: Gale Research, Inc. These volumes cover "the culture, geographical setting, and historical background of (various) peoples." This eclectic mix ranges from information about ancient civilizations to religious and ethnic groups.

Population Reference Bureau. This Washington, D.C. based organization publishes a variety of bulletins, reports, and data sheets that discuss population and its relationship to other parts of society. The focus is on education, so many of their publication are designed for classroom use, some for primary grades. Their monthly Population Today provides useful one-page summaries of individual countries.

The Statesman's Year-Book World Gazetteer. 1979. John Paxton. New York: St. Martin's Press. This gazetteer provides information on the location, recent history, population, and economic geography of the listed places.

Statistical Yearbook. Current Year. New York: The United Nations. Population and economic information about the world's nations.

World Development Report. Annual. World Bank. Oxford: Oxford University Press. Economic information keyed primarily for bankers and other financial officers.

World Encyclopedia of Cities. 1994. George Thomas Kurian. Santa Barbara: ABC-CLIO, Inc.

World Facts and Figures 3rd ed. 1989 (or most recent). New York: John Wiley & Sons, Inc. This book of tables provides statistics on a wide variety of human and physical items.

World Population Data Sheet. Annual. Washington, D.C. Population Reference Bureau, Inc. Contains the latest population estimates for the world's nations. The information includes births, deaths, natural increase, infant mortality, total fertility, life expectancy, urban population , and more.

World Regional Geography. Jesse H. Wheeler, Jr. and J. Trenton Kostbade. 1990. Philadelphia: Saunders College Publishing. This outstanding college text contains a massive bibliography by topic and region.

World Tables. Current Year. The World Bank. Baltimore: The Johns Hopkins University Press. This book focuses upon economic indicators. There are about twenty tables that compare all nations followed by nation profiles.

ENVIRONMENT, RESOURCES AND PHYSICAL GEOGRAPHY

Atlas of Economic Mineral Deposits. 1979. C.J. Dixon. Chapman & Hall. Just what it says.

Atlas of the Environment. 1990. Geoffrey Lean, Don Hinrichsen, and Adam Markham. New York: Prentice Hall Press. A variety of colorful maps, of somewhat uneven coverage.

Conservation Directory (current year). Washington, D.C. National Wildlife Federation. This is a list of organizations, agencies, and officials that are concerned with the environment. The listing is updated annually and includes the following: international, national, regional, and state organizations, U.S. and state legislative and executive branch offices, and citizens groups. The information includes the names of persons to contact, address, phone and fax number, and often a short summary of the organization's mission.

Environmental Almanac. 1992 (or most recent). World Resources Institute. Boston: Houghton Mifflin Company. 606 pp. Provides state, national, and global statistics and ratings of "green" U.S. cities.

State of the World (current year). Lester R. Brown, et. al. New York: The Worldwatch Institute and W.W. Norton & Company. This annual publication consists of about ten chapters, each one focusing upon a different issue of global environmental health. The focus of the chapters varies each year. A large current bibliography accompanies this book.

The State of the World Atlas. 1990. Joni Seager ed. New York: Simon & Schuster, Inc. This atlas has strongly colorful maps, many of which try to show three or four variables at the same time.

Vital Signs (current year): The Trends That are Shaping Our Future. Current year. Lester R. Brown, et al. New York: The Worldwatch Institute and W.W. Norton & Company. This slender volume is composed of a series of one page essays accompanied by one page of data and charts that evaluate environmental trends for the entire world rather than for nations or regions.

Water in Crisis: A Guide to the World's Fresh Water Resources. 1993 Pacific Institute for Studies in Development, Environment, and Security and Stockholm Environment Institute. New York: Oxford University Press. 473 pp. This book consists of nine essays about water followed by 182 tables that cover virtually all water topics.

World Environment Data Sheet. 1991 (or most recent). Washington, D.C.: Population Reference Bureau. "This handy resource provides information about the populations and the environmental conditions of approximately 100 countries in all of the world's regions."

World Resources (date). New York: World Resources Institute in collaboration with the United Nations Environment Programme, and the United Nations Development Programme. This biannual publication is divided into four major sections. Section one is a series of articles that focus upon a theme (e.g. people and the environment), Section two is a series of two or three essays that focus upon some portion of the world (e.g. South Asia). Section three provides substantial updates to about a dozen of the world's major environmental problems. Section four is a series of dozens of data tables with information provided for most of the world's nations. The information provided in these tables may be the most accurate, and current, environmental information available for national comparisons. The entire publication is filled with useful maps, charts, and graphs. The bibliographic entries are numerous.

APPENDIX 2: SOME THINGS
EVERY GEOGRAPHY STUDENT SHOULD KNOW FOR PERSPECTIVE

Latitudes of some US places and international equivalents

your home town
55 -- southern Alaska - Moscow (northern Ireland, southern tip of Chile)
49 -- Montana/Canada border - Paris (northern Mongolia, south of New Zealand)
40 -- Philadelphia - Beijing (North Korea, middle of Spain, southern Italy)
35 -- north of Los Angeles - Tokyo (Spain, Tehran, Buenos Aires)
30 -- New Orleans - New Delhi (Kuwait, middle of South Africa)
25 -- tip of Florida - Taiwan (central Egypt, middle of Australia)
22 -- Honolulu - Rio de Janeiro (Mecca, Hong Kong)

low-high temperatures, winter and summer, and annual precipitation in inches

your home town -- (____ to ____ in January, ____ to ____ in July, ____ inches)
East -- Miami (59-75, 76-89, 56 inches), New York (26-37, 69-84, 42 inches)
Center -- Dallas (36-55, 75-94, 37 inches), Minneapolis (3-21, 63-83, 28 inches)
Interior -- Phoenix (40-66, 80-105, 8 inches), Denver 16-43, 59-88, 15 inches)
West -- Los Angeles (47-67, 65-84, 15 inches), Seattle (35-45, 55-75, 37 inches)

Half a dozen Distances

two prominent local features that are one mile apart -- __________ and __________
two prominent local features that are 100 miles apart -- __________ and __________
distance across your home state -- __________
New York to San Francisco -- a bit less than 3000 miles
Canada border to Texas tip -- a bit more than 1500 miles
around the world -- about 25,000 miles

Half a dozen Areas

your home state -- __________
a prominent local feature that is one square mile in area -- __________
Connecticut -- about 5 thousand square miles
Alabama -- about 50 thousand square miles
Texas -- a bit more than 1/4 million square miles
the United States -- about 3 1/2 million square miles

Half a dozen Populations

your home town -- __________
your home state -- __________
the largest urban area in your state -- __________
the United States -- 260 million
the world today -- 5800 million
the world in 1900 -- 1400 million

A dozen Amounts

the GNP of the United States -- about 7 million million dollars
the Federal Budget -- about 1.5 million million dollars
the military budget -- about 275 billion dollars
annual interest on the national debt -- more than 200 billion dollars
average income per person in the United States -- more than 18 thousand dollars
average income per person in your home state -- ________
the official poverty line for a family of four -- about 15 thousand dollars
annual budget of your entire school -- ________
value of three-bedroom house in your home town -- ________
cost of a typical pickup truck -- about 18 thousand dollars
cost of a front-line fighter plane -- 4 million dollars
tuition and fees at Harvard -- 27 thousand dollars per year

Half a dozen Rates

unemployment during the worst of the Depression -- more than 20 percent
unemployment at present -- about 6 percent (this can change quickly)
inflation at present -- about 3 percent (this can change quickly)
the prime rate -- about 7 percent (this can change quickly)
population growth rate and doubling time, US -- 0.7%, double in 100 years
population growth rate and doubling time, world -- 1.4%, double in 50 years

A dozen Percentages

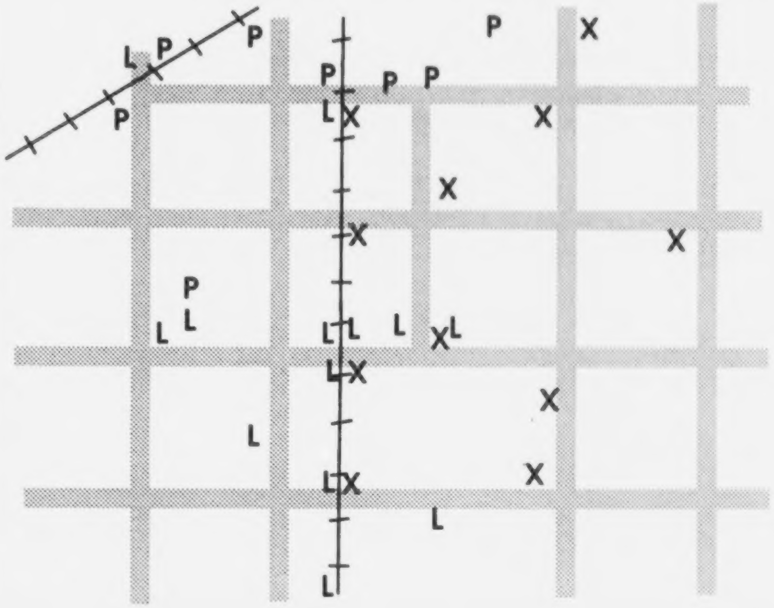
agriculture as percent of national income -- less than 2 percent
percentage of cropland in your home state -- _______
manufacturing as percent of home state income-- _______
manufacturing as percent of national income -- about 19 percent
government as percent of national income -- about 21 percent
people on military payroll in home state -- _______
people on military payroll in nation -- about 2.5 million, 2 percent of total
female income as percent of male in several occupations -- _______
southern wealth -- 32 percent of nation before the Civil War
southern wealth -- 12 percent of nation after the Civil War

Half a dozen Trends and Miscellanies

a good corn yield -- 140 bushels per acre
average commuting time in your home town -- _______
average life expectancy in 1776 and 1995 -- 38 and 74 years
average income of someone between the ages of 25 and 34 in 1990
    without a high-school degree -- $10,400
    with a high-school degree -- $16,100
    with a college degree -- $26,200

Many of these figures came from *The Statistical Abstract of the United States* (available from the Superintendent of Documents, Washington, DC, 202-783-3238, and also from The Reference Press, Austin, TX, 512-454-7778) and from standard almanacs -- it is a good exercise for students to update these figures, many of which are probably out of date by the time you get this book!

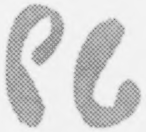
Graffiti as Territorial Markers - 1



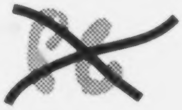
Each letter
shows marks
made by
a specific
gang

0A

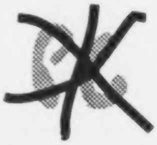
Graffiti as Territorial Markers - 2



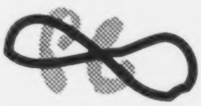
Marking territory -- "this is ours"



Disputing territory -- "no, it's not"



Warning -- "no trespassing"



Threat -- "we know where you live"

0B

TEACHER'S GUIDE, TRANSPARENCIES 0A AND 0B

A *point-symbol map* is a simple and straightforward kind of map. To make it, someone identifies a feature in the real world and puts a symbol on the map to show the location of the feature. In this transparency, the feature is a particular kind of graffiti painted on a wall or bridge abutment. The map is copied from one I saw in a Los Angeles police station (letters and some details are changed to protect the innocent, namely ME). When officers on patrol notice some important new graffiti, they put pins in the appropriate locations on the map.

In that particular part of Los Angeles, graffiti often are territorial markers -- they indicate which gang claims control of an area. The "code" has three parts:

1) A group "signs its name" to a wall or bridge by painting a symbol or a group of letters that the gang has adopted as its "tag."

2) A group writes over another group's tag with a symbol to indicate disagreement. In this part of Los Angeles, you draw an X over a rival gang's tag to show that you deny their claim to the area. An asterisk goes one step further, announcing that anyone who strays over the line may be beaten or even killed. An infinity sign is the strongest statement -- it basically extends the threat to include girlfriends and families of rival gang members.

3) A special letter code returns the challenge (saying, basically, "same to you"). An intriguing example of this use of graffiti code is the sign in front of an East Los Angeles police station. The carved wooden sign has an engraved "C/s" in the corner; that is the local gang code for "same to you." It warns gangs not to deface the police sign because, in effect, "we're the biggest and baddest gang around here."

Of course, there is also mere wall-writing. Some graffiti have a life-or-death message, but more than 90 percent of wall graffiti have no special significance. That is another way graffiti are like a microcosm of the real world, where some landscape features are very revealing but most have no special message.

Hidden in that sentence is a good reason to study geography: to learn what landscape features carry messages that are worth knowing.

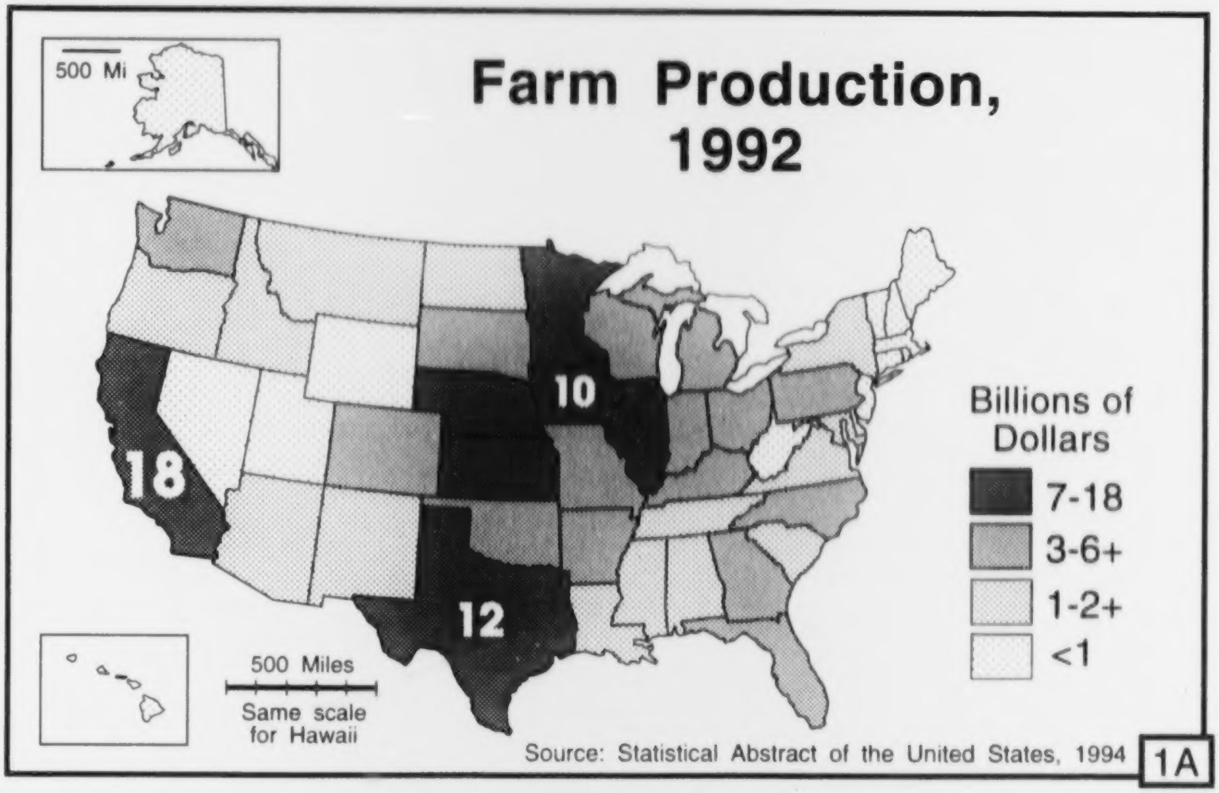
Put dots on a map to show where something is located in the real world.

Activity: make a point-symbol map of some feature in a fairly small area. The topic can be practically anything -- fire hydrants, broken windows, pickup trucks, eagle sightings, dust bunnies under a bed, peas on a plate, you get the idea. Start with a *base map*, a sketch that has some important features, such as major roads, buildings, walls, the edge of the plate, etc. Then add *point symbols* (dots, circles, triangles, X's, etc.) in the proper locations to represent the feature(s).

Then have someone else read the map, to see if things are where the map says they are.

Here is a simple test of whether a point-symbol map is well made: can someone read the map, go to a place, and see the feature the map says is there? That test, however, can be remarkably hard to pass; a graphic language that makes sense to a map maker does not always communicate a clear message to a map reader.

That is why the National Geography Standards has a large section on geographic skills. Map-making and map-reading are a family of essential skills that help us understand places, but students have to "learn the code" to use the skills.

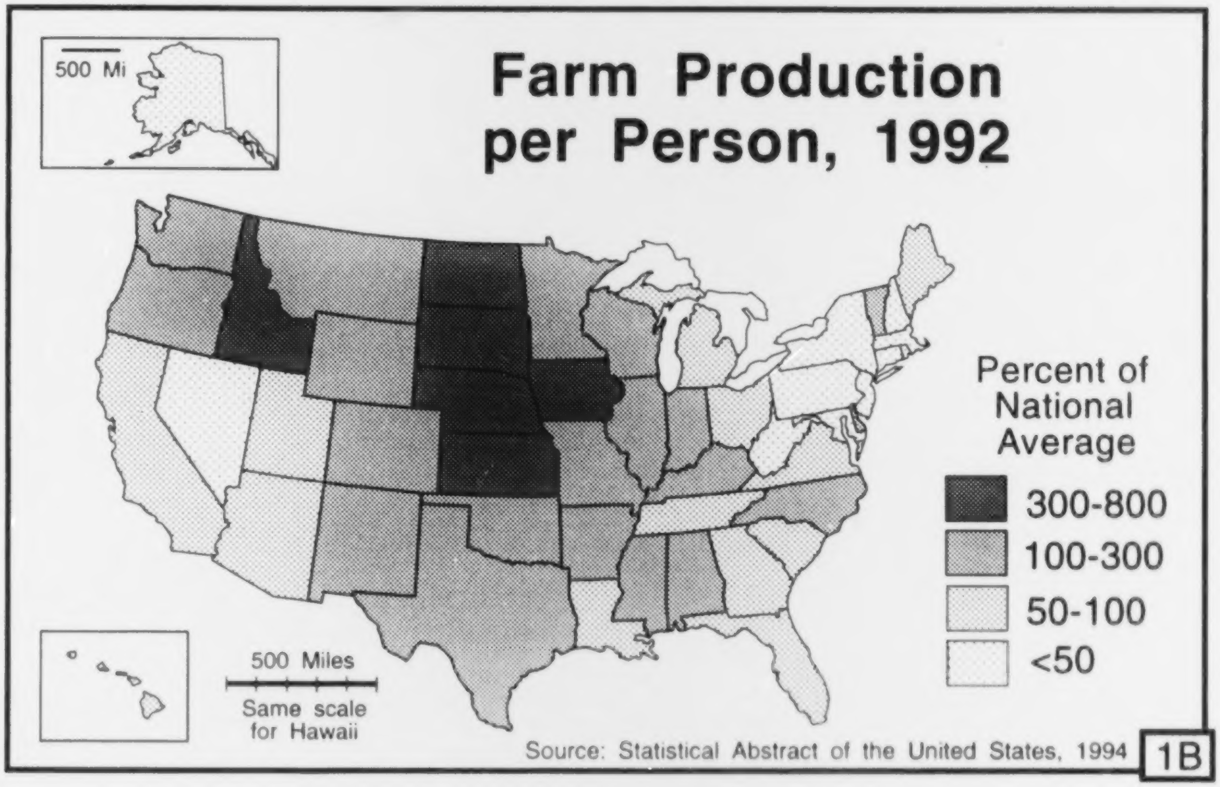


Farm Production, 1992

500 Mi
18
10
12
500 Miles
Same scale for Hawaii
Billions of Dollars
▨ 7-18
▨ 3-6+
▨ 1-2+
▨ <1

Source: Statistical Abstract of the United States, 1994

1A



Farm Production per Person, 1992

500 Mi
500 Miles
Same scale for Hawaii
Percent of National Average
▨ 300-800
▨ 100-300
▨ 50-100
▨ <50

Source: Statistical Abstract of the United States, 1994

1B

TEACHER'S GUIDE, TRANSPARENCIES 1A AND 1B

Transparency 1A is a bad example (and 1B is a good example) of a *choropleth* (CORE-oh-pleth) map.

The choropleth map "language" is used for information that is collected for political units, such as countries, states, or counties. Examples of such information include census data, crime rates, and voting percentages.

Gathering information for political areas does not tell us about the arrangement of things within the area. An honest way to show that information, therefore, is to color an entire area according to the information that applies to it. This strategy, however, can mislead readers in several ways. To minimize error, cartographers have conventional rules about how to make choropleth maps:

1) *Use choropleth maps for ratio data* (numbers computed by dividing two counts, such as amount of production and number of people, in order to get a ratio: production per person). That is what Transparency 1B did right. Map 1A used choropleth symbols to show counts. That can be misleading, because the count in a state often depends on how big the state is. It is better to use *graduated symbols* (e.g., different-sized circles) to show counts, because readers can visually compare the size of a circle with the size of a state to get a more accurate picture.

2) *Pay attention to category boundaries.* We put numbers on Map 1A to show actual production in the top three states. How different would the map seem if the darkest category had only states with more than 10 billion dollars of farm products? This illustrates an important point: a map-maker can make choices that are not "wrong" but still alter the appearance of the map. That realization is a useful learner outcome.

3) *Colors should go in a logical sequence.* The conventional rule is to represent low values with light colors and higher values with progressively darker colors.

Find maps in newspapers and magazines and evaluate them.

Activity: have students find choropleth maps in magazines and newspapers. Did the authors follow these three basic rules? You'd be surprised how often they don't. If you find a particularly good (bad!) example, cover the legend and ask students which areas have the highest values. Discussion should lead to two conclusions:

- a map with a non-intuitive color sequence may accurately portray each individual area, BUT
- having to consult the legend frequently makes the reader work harder to see the larger pattern.

Since pattern depiction is a major purpose of making maps, students should wonder whether someone who chooses a bad color sequence is just ignorant or is deliberately trying to mislead.

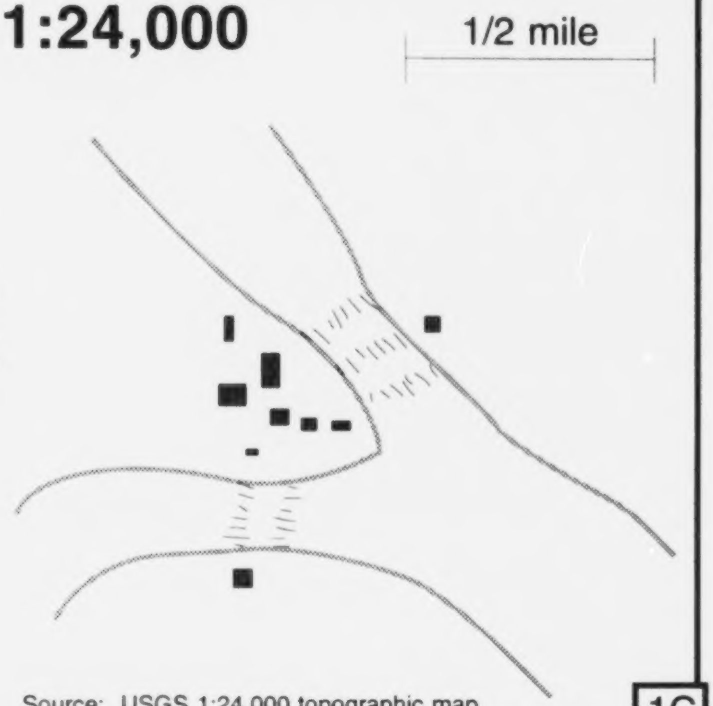
Give students a table of numbers and have them make a map.

Activity: give students a table of numbers for an area with about 20 sub-areas, and have them make choropleth maps with different numbers of categories and boundaries between categories.

For a how-to manual with interesting data, get *Thematic Maps: Visualizing Patterns*, by Carol Gersmehl, prepared for Tennessee Geographic Alliance summer institutes. I admit that I "borrowed" many ideas from this teacher-tested manual. I also realize that the one-page discussion above is a bit sketchy, but remember, this page is just two of 85 example transparencies; keep reading!

At a scale of 1:24,000

Harpers Ferry
is where two rivers
flow over hard rock
and are therefore
narrow, shallow,
and (relatively!)
easy to cross.



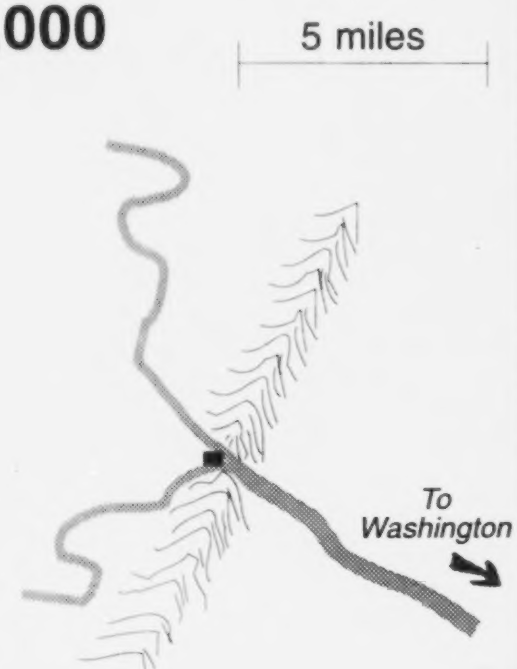
Source: USGS 1:24,000 topographic map

1C

At a scale of 1:250,000

Harpers Ferry
is where the Potomac
cuts through a long ridge
before flowing toward
Washington, DC.

(It's where the Union army
had to make a stand.)



Source: USGS 1:250,000 topographic map

1D

TEACHER'S GUIDE FOR TRANSPARENCY 1C

This map is greatly simplified from a 1:24,000 *topographic map*. Maps like this are available for most parts of the United States; write to the Map Distribution Center, U.S. Geological Survey, Federal Center, Denver, CO 80225, for a (free!) index map of your state, which you can use to select maps for purchase.

Post topographic maps of the local area and watch students get interested.

Activity: Putting a topographic map of the local area on a bulletin board is a tested recipe for excited before-class and during-recess discussion. These maps show a host of familiar details in a new light. Once you have grabbed attention with a local map, channel that attention (and new map-reading skills) to other areas.

One key to successful use of topographic maps is to know the advantages and limitations of each *scale*. Maps with a scale of 1:24,000 (the fraction means that an inch on the map is 24,000 inches or 2,000 feet in the real world) have a wealth of fine detail but cannot show more than a few dozen square miles at a time. People with really big bulletin boards can arrange a handful of these maps to show a larger area. A subject the size of Atlanta and its suburbs, however, will probably take more space than most teachers have available.

The answer to this dilemma is to find other maps at different scales. Here, the Geological Survey is most accommodating: it also produces maps at scales of 1:50,000; 1:100,000; 1:250,000; and 1:500,000.

TEACHER'S GUIDE FOR TRANSPARENCY 1D

Topographic maps at a scale of 1:250,000 are especially useful for travel planning. These maps show major roads, rivers, terrain features, and forest regions. As you can see on this transparency, however, a 1:250,000 map cannot show individual houses or details such as the rapids in the river. In other words, *someone looking at a map of Harpers Ferry at a scale of 1:250,000 will miss precisely what seemed most strategically important at a scale of 1:24,000, namely the shallow water that made the river easy to cross.*

This raises an intriguing point: what we "know" about the world may depend on the scale at which we view it. The only good solution to this dilemma is to examine places at several scales.

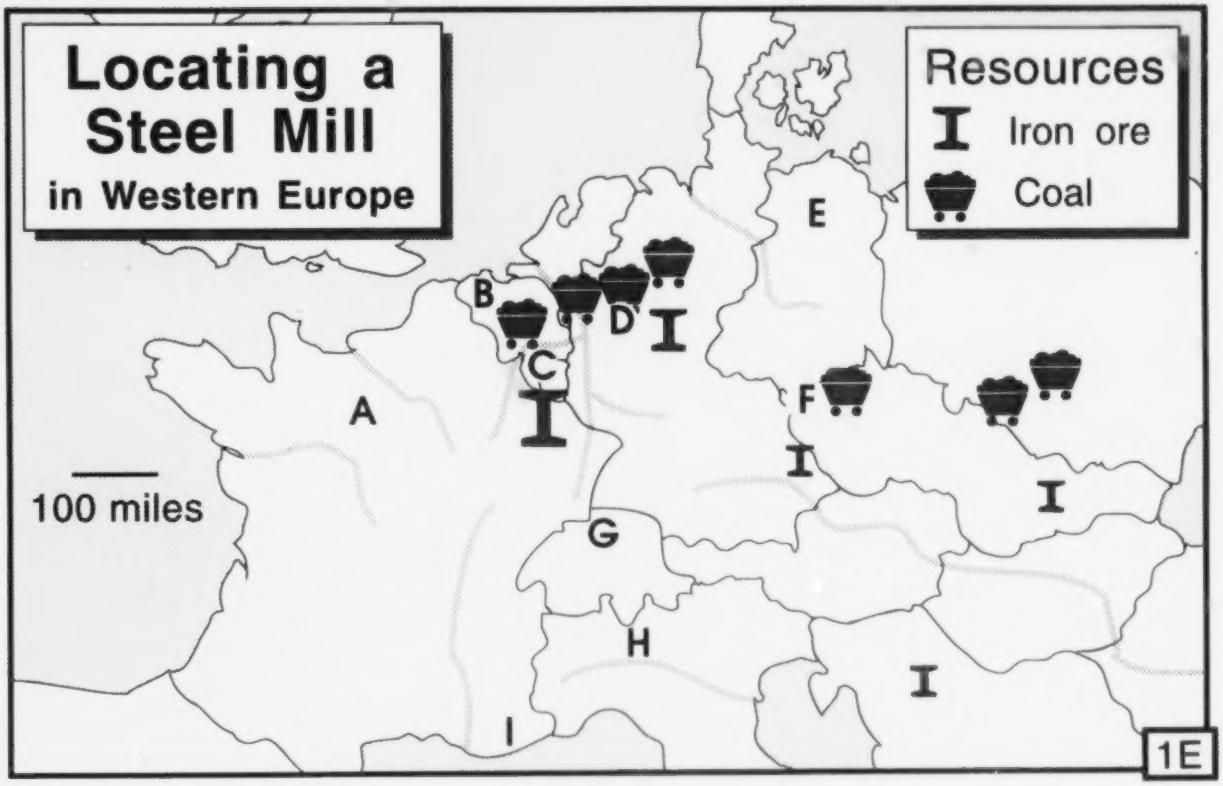
Gather and post maps of varying scales

and ask what kind of information is customarily shown at each scale.

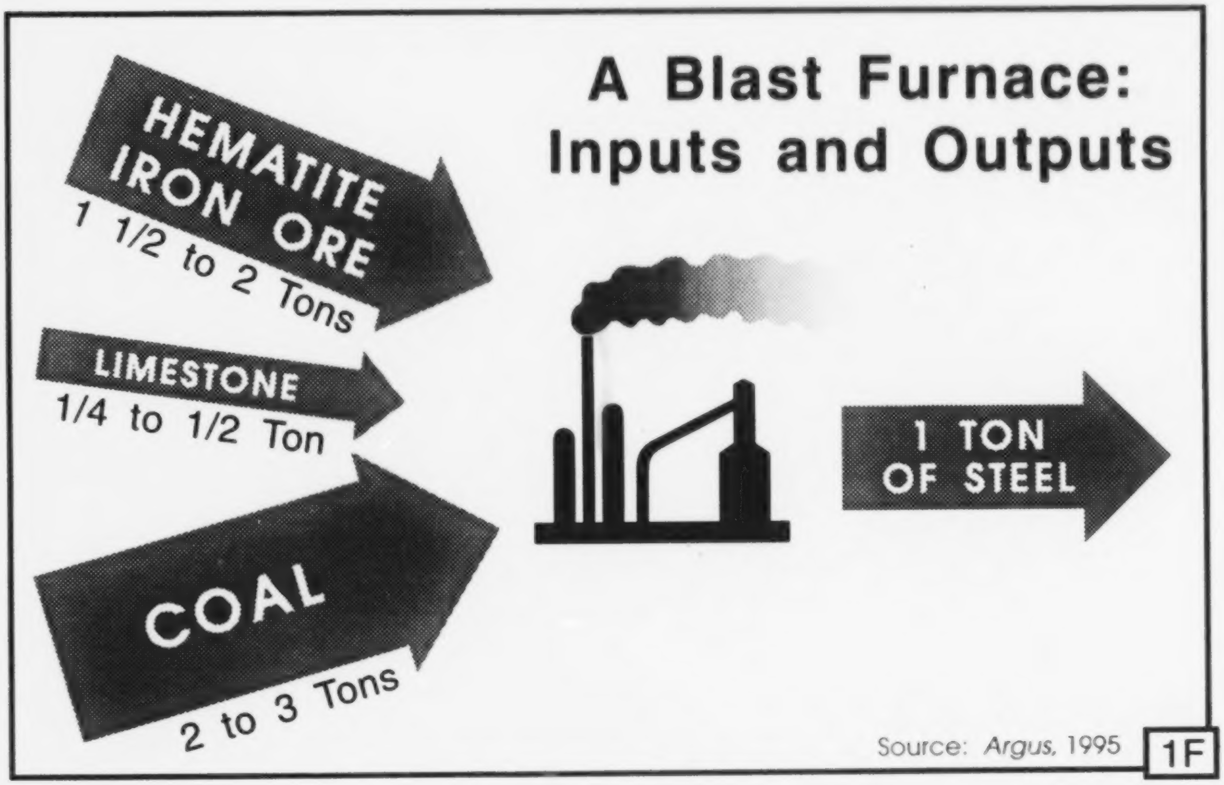
Activity: have students gather as many different maps as they can find for a specific area. Look at road maps, newspapers, county and city offices, Chambers of Commerce, and travel brochures (remember those welcome plazas as you enter a state on an Interstate Highway? they often have brochures with maps of individual towns and counties).

Then, post the maps (or copies of them) in scale order, with the most detailed maps at one end and maps that cover an entire state or country on the other. Ask students to examine the maps and tabulate what kinds of information appear at each scale. The flip side of that coin is a good test question: "What scale map should you ask for if you wanted to find out about the pattern of houses in Roseville? the distance from Moscow to Berlin? etc."

Extra: by 1994, the DeLorme Company (Freeport, Maine) had printed books of topographic maps for about 20 states, with more planned. Check a bookstore to see if you live or travel in those states. These books are great resources!



Locating a Steel Mill
in Western Europe
Resources
Iron ore
Coal
A
B
C
D
E
F
G
H
I
100 miles
1E



A Blast Furnace: Inputs and Outputs
HEMATITE IRON ORE
1 1/2 to 2 Tons
LIMESTONE
1/4 to 1/2 Ton
COAL
2 to 3 Tons
1 TON OF STEEL
1F

Source: *Argus*, 1995

TEACHER'S GUIDE FOR TRANSPARENCY 1E

Iron and steel mills were big business in the late 1800s, like textiles in the early 1800s, autos in the mid-1900s, and computers in the late 1900s. Each of these industries employed millions of workers. Moreover, they were buyers of other products, and they provided raw materials for many other factories and services. As a result, they had a great influence on patterns of wealth and population.

In short, if you want to understand the world economy of the late 1800s, you have to look at where iron and steel were made.

This map shows part of Europe, from France to former Czechoslovakia. It is deliberately drawn with very faint lines for national borders, because in fact these borders changed several times. Moreover, many of the international tensions that led to 20th-century wars were related to control of key transportation routes and the raw materials for iron and steel mills.

Discuss which places would be good locations for a steel mill.

Activity: Show the transparency and ask which lettered places would be good locations for steel mills. In order from A to I, the places are Paris, Antwerp (Belgium), Luxembourg, Essen-Dusseldorf (the Ruhr Valley), Berlin, the Elbe Valley from Dresden to the western Czech Republic, Basel (Switzerland), Milan (Italy), and St Tropez (France).

Of those, D was/is the largest steel center; it is located close to a major coal deposit and directly downstream from the largest iron ore mines in Europe. Places C and F are also important (the Czech area was a world-famous example of severe air pollution). To make this Activity more analytical, read on.

TEACHER'S GUIDE FOR TRANSPARENCY 1F

Locating a steel mill is a *tradeoff* decision. The recipe for steel is simple: mix coal, iron ore, and limestone. Cook well. Then ship the steel to the customers. Unfortunately, the raw materials and buyers are usually in different places. As a result, people building a steel mill must pick a compromise location.

This transparency graphically shows that a blast furnace needs more coal than ore, and therefore it usually makes sense to put it close to coal mines. Moreover, since it is cheaper to transport heavy material in boats than by other means, it usually makes sense to put mills on major rivers or in ports. (Think of the locations of big American steel mills: Pittsburgh, Cleveland, Detroit, Gary, Chicago, and Baltimore are all on navigable water, closer to the source of coal than to the iron ore deposits of northern Michigan, Minnesota, and Brazil.)

Read about industry, and try to draw an input/output diagram.

Activity: Use this diagram to aid a discussion of Transparency 1E. Then, if desired, have students try to draw a similar diagram showing the inputs and outputs of another industry.

CAUTION: steel-making is "heavy" industry; the raw materials and product weigh a great deal and are expensive to transport. As a result, people try to locate factories between the sources of raw materials and the market. Some industries have raw materials and products that are so light and easy to transport that factories can be located almost anywhere.

Activity: Have students try to classify specified industries as heavy or light: e.g., oil refining (H), computer assembly (L), copper smelting (H), diamond cutting (L), grain milling (H), and shirt sewing (sorta in-between). Some of the light and in-between industries tend to locate closer to other things, such as skilled labor, capital, or clean water.

Locating a Steel Mill in Western Europe

10 Income: start with 10 points

– ____ Subtract for hauling iron ore
  -1 point for 100 miles by boat
  -2 points for 100 miles on land

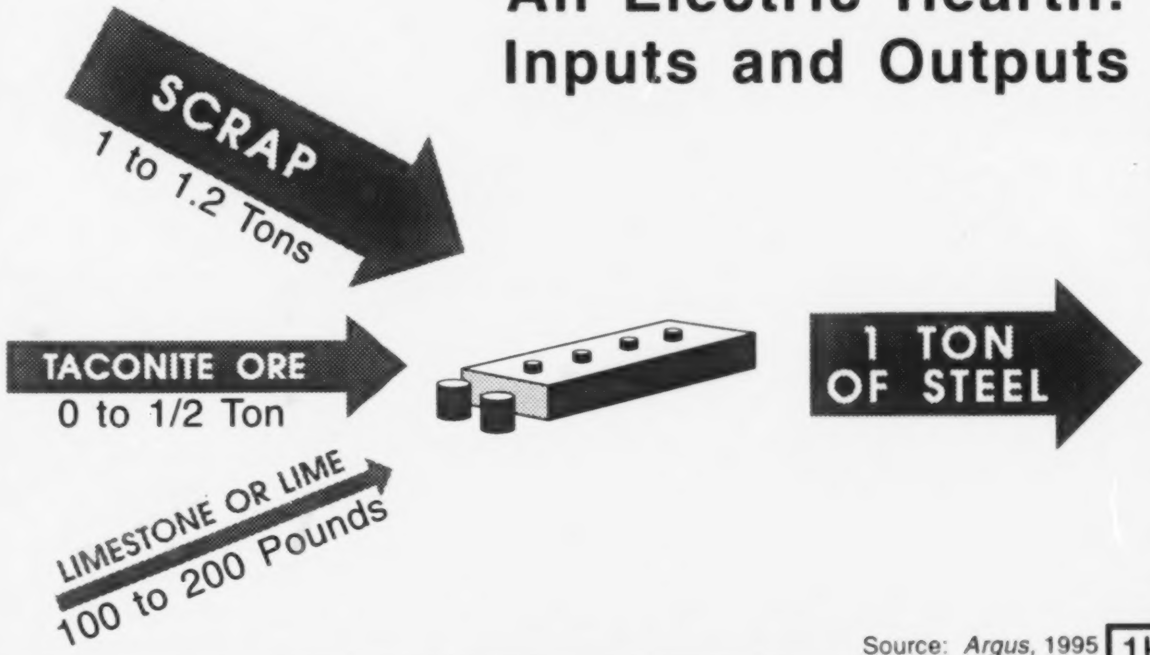
– ____ Subtract for hauling coal
  -2 points for 100 miles by boat
  -3 points for 100 miles on land

+ ____ Add 1 point if near the population center
(the middle of the map)

____ ***What do you have left?***

1G

An Electric Hearth: Inputs and Outputs


SCRAP
1 to 1.2 Tons
TACONITE ORE
0 to 1/2 Ton
LIMESTONE OR LIME
100 to 200 Pounds
1 TON OF STEEL

Source: *Argus*, 1995

1H

TEACHER'S GUIDE FOR TRANSPARENCY 1G

The key to finding a good location for heavy industry is to minimize the cost of transporting raw materials. Assigning "penalties" to each potential site is one way to make this analysis more rigorous than simply "eyeballing" a map.

Do what you did with Transparency 1E, but with more rigor, by measuring distances.

Activity: Assign groups or individual students to figure the penalties for transporting materials to each lettered site on Transparency 1E:

1) estimate the distance.

2) note whether the route goes over land or by boat.

3) figure the transportation penalty.

If this seems too easy for your students, you can add complexity in several ways. Add penalties for crossing mountains or national borders. Add penalties for areas with severe air and water pollution, such as the Ruhr or middle Elbe. Have them do research on mining and add penalties for using inferior coal or iron ore.

TEACHER'S GUIDE FOR TRANSPARENCY 1H

Together with Transparency 1F, this diagram helps introduce some of the knottiest policy questions of the late 20th century.

What should people do when their factory town is no longer in a suitable location for a particular kind of industry?

What should people do when changing technology has made their town a less desirable location for a particular kind of industry?

What should people do when "what they always have done" is no longer able to compete in the international economy?

Phrasing a question in a particular way tends to restrict the range of options that might be considered. This is important for students to learn, because the three questions are really just aspects of the same issue. Emphasize that *a decreasing ability to compete may not be anyone's "fault."* The human tendency is to seek a scapegoat -- to blame factory owners, labor unions, recent immigrants, or government policy for something that may be nothing more (and nothing less!) than an inevitable geographic consequence of technologic change.

It may be useful to put the question into a larger perspective: a change in technology has made steel-making more efficient and steel less expensive. Consumers throughout the country have gained, even though producers in a few areas have been hurt. A humane society should take this geographic fact into account in designing policies for dealing with unemployment and migration.

Activity: assign roles (e.g., mayor, labor leader, minister, storekeeper, etc.) to play in simulating a town that "lost" its major employer.

Discuss (or role-play) what people can do when their town loses its major industry.

These transparencies can help a teacher show why an old steel mill in one place may not be able to compete with new electric furnaces in better locations for that technology. Or, if desired, modify the simulation to fit another economic activity, such as a textile mill, meat-packing plant, drive-in theater, or small TV store threatened by a new superstore. Have students discuss options: moving away, retraining for other work, rebuilding the mill, etc. Have them prepare maps to illustrate the options. The key question is: does this proposed activity fit this environment? This is the big question of economic geography; it takes years to learn how to answer it well. We cannot do it all in four transparencies, but woe to a society that does not teach its citizens at least to appreciate the need to think about the locational consequences of technologic change.

Land per Person

	Million acres	Million people	Acres per person
Argentina	686	34	20.2
Bangladesh	36	117	0.3
Canada	2465	29	85.0
U. S.	2263	261	8.7
Mexico	488	92	____
Germany	88	81	____
Japan	93	125	____

Source: Information Please Almanac, 1995

1I

Cropland per Person

	Million acres	Million people	Acres per person
Argentina	62	34	1.8
Bangladesh	22	117	0.2
Canada	123	29	4.3
U. S.	453	261	1.7
Mexico	59	92	____
Germany	28	81	____
Japan	10	125	____

Source: Information Please Almanac, 1995; World Resources, 1994-5

1J

TEACHER'S GUIDE FOR TRANSPARENCY 1I

The basic idea of "per data" is simple: take a quantity you want to compare and divide it by whatever will make the comparison meaningful.

We must admit, however, that the real-world use of per data can be confusing, especially if someone is not sure what is being divided by what. That raises a messy question: how can students get an accurate message from newspaper or television stories if they cannot figure out how the tables or maps of per data were made? For this reason, it helps to use per data frequently, so that students gradually improve their ability to interpret the results.

Compare countries by calculating acres per person.

Activity: Project the Transparency and have students fill in the blanks by dividing the number for population into the number for total land area. Since both numbers are expressed in millions, the millions "cancel out" and the result is the number of acres per person. Work through some of the examples that have already been calculated -- the answers for the blanks are 5.3 for Mexico, 1.1 for Germany, and 0.7 for Japan.

Once students get the idea, you can add complexity. For example, is the number of acres per person the most useful per-number, or would another one be more meaningful? Someone might note that people cannot grow food in deserts or mountains. It is therefore useful to know how much land in a country is "good." One could make a transition to Transparency 1J by writing seven numbers in a column right next to the country names: 9, 62, 5, 20, 12, 32, 11. These numbers indicate the percentage of land area that can be used for crops (right, another per number!). Multiplying Argentina's 686 million acres of land by 9 percent (9/100) gives a result of 62 million acres of cropland. Have students work as many as needed, and then project Transparency 1J; the answers are in the first column.

TEACHER'S GUIDE FOR TRANSPARENCY 1J

Repeat the recipe for per data: "take a quantity you want to compare and divide it by whatever will make a meaningful comparison." Agricultural land, for example, is meaningful in terms of how many people must be fed. A relevant per-measure, therefore, is the number of acres per person (the number of acres of cropland divided by the number of people).

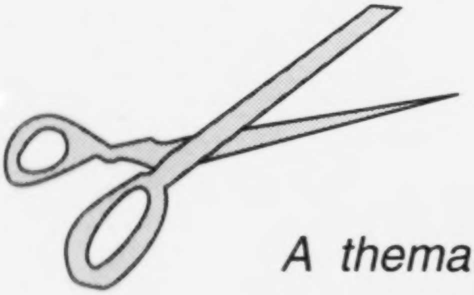
Compare countries by calculating acres of cropland per person.

Activity: Project the Transparency and have students calculate the number of cropland acres per person (0.6 for Mexico, 0.3 for Germany, less than 0.1 for Japan; underscore that the amount of cropland per person in Japan is less than one-twentieth as much as in the United States).

That, as the text says, is one reason why Americans historically have not had to be as concerned about some basic issues of geography: the efficiency and equity of the use of land and the spatial arrangement of things. Compared with other industrial countries, Americans have had plenty of cropland for food and plenty of "empty" land for buildings, roads, parks, waste disposal, and other uses. As population increases, however, land issues become more important, which is one reason for the upsurge of interest in geography in American schools.

As discussion proceeds, someone might note that land is not equally productive. That is a good observation, and it leads to another kind of per data: yield per acre. Bangladesh gets several crops of rice each year, whereas the average wheat yield per acre of cold Canadian soil is much less than the corn yield in Iowa. An almanac or encyclopedia can provide data for calculating ratios such as food production per person, calories per pound of food, calories per person, protein per person, and so on until students see how countries compare.

The Geographical Scissors - 1



A reference map

the local puzzle
that makes looking
at thematic maps
of a larger area
seem worthwhile.

A thematic map

the broader perspective
that helps us understand
what is happening
in a local area

2A

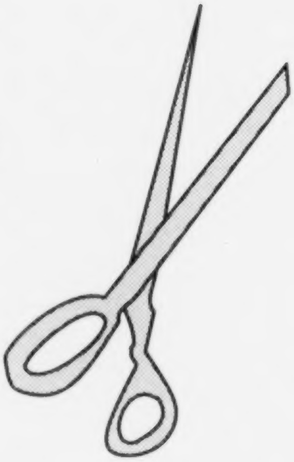
The Geographical Scissors - 2

A reference map

uses a variety of symbols
to show how a number of things
interact in a fairly small area
to make that place what it is.

A thematic map

uses standard symbols
to show how a specific thing
is arranged in a fairly large area



2B

TEACHER'S GUIDE FOR TRANSPARENCY 2A

One of the biggest debates we had in writing this book was whether to put this diagram at the beginning or the end of this chapter. Near the beginning, it could provide a handy guide, like a roadmap to the rest of the chapter. At the end, it could be a nice summary of the main point.

The answer to the question, of course, is that I would really have liked to see your faces as you go through this section. That feedback would have helped us decide how to present other ideas!

Experiment with different sequences of presentation

> Activity: try it both ways. Use the transparency to explain the idea of a geographical scissors to some classes. Then ask students in those classes to think of some examples, with some guidance from the ones described in the text. In another class, start by describing some examples and use them to lead into a discussion of the principle of cooperative working of two ideas. Then ask what kind of tool comes to mind as they think about the principle. Suggest several options: a drill, chainsaw, hammer, scissors, etc. (Maybe then you could tell me what worked better in your class, and what you think is the reason why.)

Chapter 5 talks more about deductive and inductive logic and the use of themes in teaching. Here, let us just say that a teacher could use nearly every one of the diagrams in this book in several ways: as an outline for future discussion, as an organizer of ongoing discussion, or as a summary of previous discussion. We do not presume to know what will work best in a given situation. In fact, we have used most of the diagrams in several ways, depending on the circumstance. That Helps explain some of the design decisions we made in producing the diagrams.

TEACHER'S GUIDE FOR TRANSPARENCY 2B

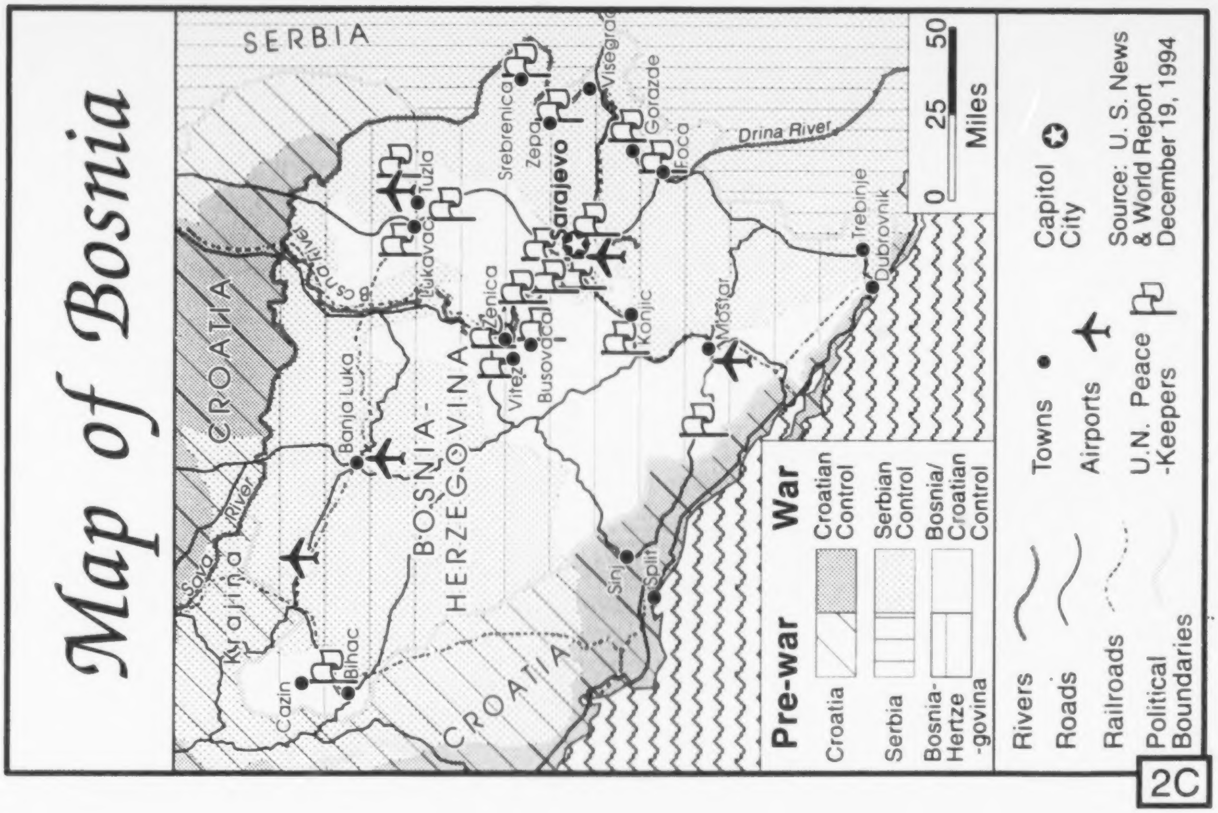
Better yet, use several versions of an important diagram at different times in the discussion (preferably on different days, to build in the reinforcement that seems to be essential to durable learning). Transparencies 2C through 2F are examples of several levels of complexity in designing a map.

Use markers to clarify differences or add information to a transparency

> Activity: use markers to add colors or additional symbols to these transparencies. Colors can simplify a map by making symbols more distinguishable. Additional symbols can highlight spatial relationships by showing the features that occur together. In short, even though we make maps for a living, we have to admit that no cartographer has ever climbed to the top of a mountain and received a stone tablet with a full set of instructions about what to include on a map. Choosing map symbols is a human decision, with plenty of possibilities for both creativity and confusion.

We find that washable markers (such as Sanford's Vis-a-Vis) work well for in-class notes made on a transparency and then wiped off later. Permanent markers (such as Dennison's Marks-a-Lot or Flair's El Marko) can be used to make pre-class changes for use in several classes. These trade names are illustrations, not recommendations -- you have to experiment with various kinds of markers, because the solvents in a specific marker and the toner used in a specific transparency machine can interact in unpredictable ways.

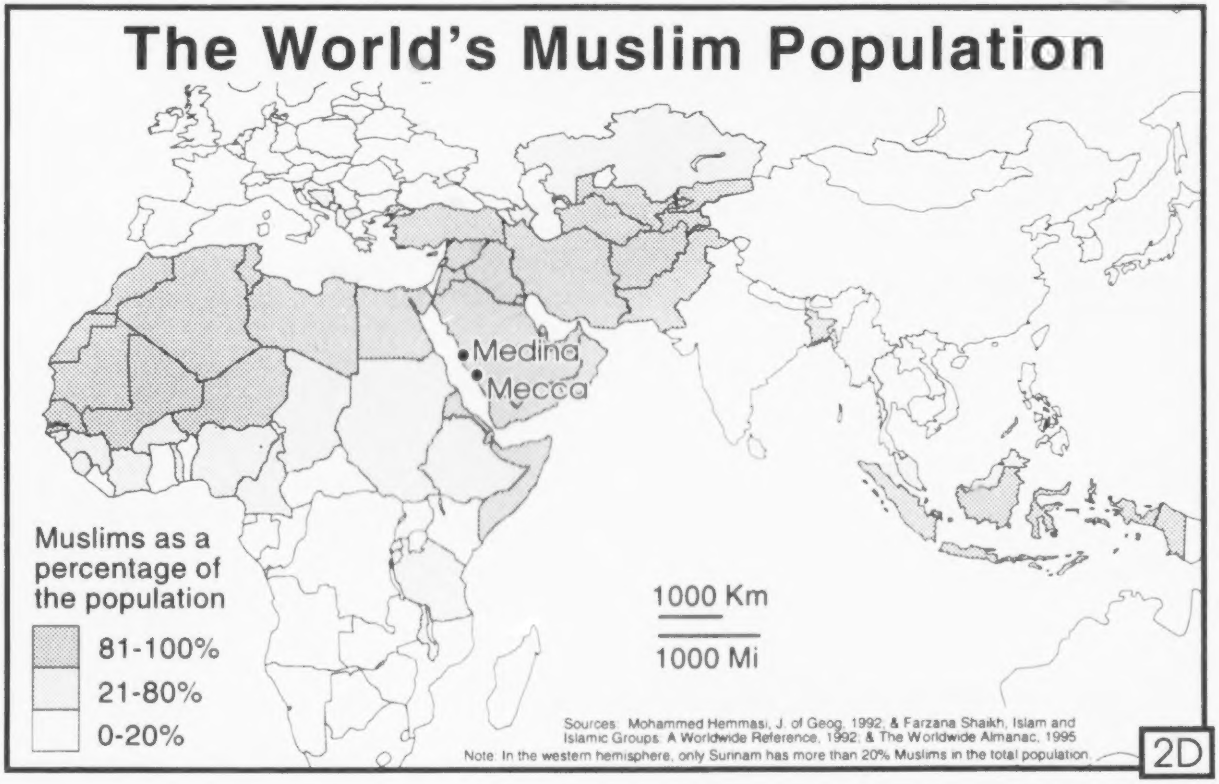
Map of Bosnia


SERBIA
CROATIA
CROATIA
BOSNIA-HERZEGOVINA
Krajina
Sava River
Drina River
Cazin
Bihac
Banja Luka
Tuzla
Lukavac
Zenica
Vitez
Busovaca
Srebrenica
Zepa
Visegrad
Gorazde
Foca
Sarajevo
Konjic
Mostar
Sinj
Split
Trebinje
Dubrovnik
0
25
50
Miles
Pre-war
War
Croatia
Croatian Control
Serbia
Serbian Control
Bosnia-Hertze-govina
Bosnia/Croatian Control
Rivers
Roads
Railroads
Political Boundaries
Towns
Airports
U.N. Peace-Keepers
Capitol City

Source: U. S. News & World Report December 19, 1994

2C

The World's Muslim Population


Medina
Mecca
1000 Km
1000 Mi
Muslims as a percentage of the population
81-100%
21-80%
0-20%

Sources: Mohammed Hemmasi, J. of Geog. 1992; & Farzana Shaikh, Islam and Islamic Groups: A Worldwide Reference, 1992; & The Worldwide Almanac, 1995

Note: In the western hemisphere, only Surinam has more than 20% Muslims in the total population.

2D

TEACHER'S GUIDE FOR TRANSPARENCY 2C

A *reference map* shows the locations and spatial relationships of many things within an area. It usually has a large legend, since the map must have symbols to show a variety of features: mountains, rivers, swamps, cities, roads, etc.

A reference-map designer can make the map reader's job easier by trying to select symbols that are easy to remember -- (e.g., wiggly lines for rivers, fuzzy patterns for forests). Color can help, because people associate some colors with specific ideas (e.g., green with trees, blue with water, gray with borders or roads).

Find out if map symbols have intuitively obvious meanings.

Activity: post or project some reference maps from an atlas, newspaper, or magazine. Then cover the legend and ask students what they think specific symbols might mean. Have them discuss why they associate particular meanings with particular colors, patterns, or other symbols. Summarize by pointing out that a good map-maker usually tries to choose symbols that have an intuitively obvious meaning.

TEACHER'S GUIDE FOR TRANSPARENCY 2D

A *thematic map* tries to show the spatial pattern of one thing. A thematic-map designer can make the map reader's job easier by using conventional ways to show each idea -- dots for cities, shaded areas for forests or ownership, choropleth symbols for ratios such as crime rate or population density, and so forth. The main purpose of many of these transparencies is to illustrate the selection of appropriate symbols to show specific ideas.

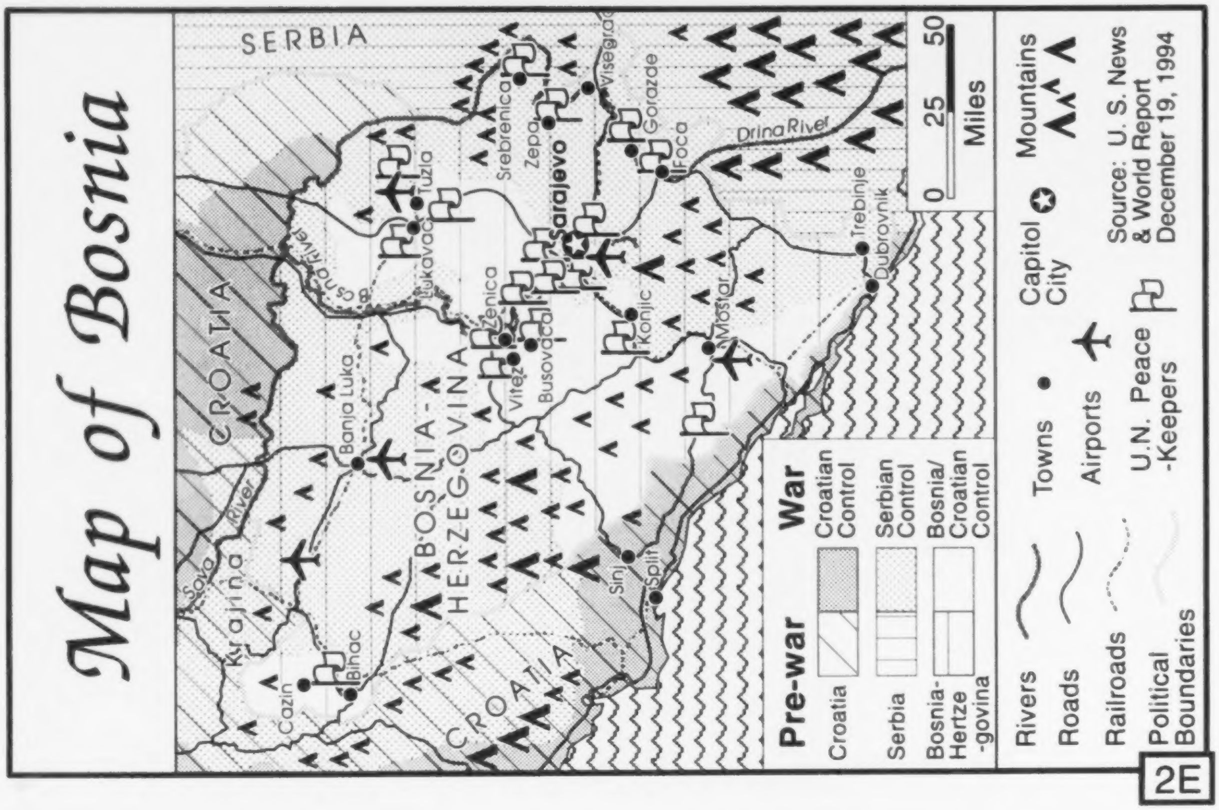
Have students classify maps as thematic, reference, or both.

Activity: to get students started on the path to being good evaluators as well as users of maps, find a number of reference and thematic maps. Post or project them, and have students try to classify the maps into four categories:

- pure reference maps, such as USGS topographic maps or the whole-country maps that often appear near the beginnings of encyclopedia or magazine articles.
- pure thematic maps, such as dot maps of population, *choropleth* maps of ethnic origin, or *isoline* maps of temperature. (These terms will be defined and explained later; just look for maps that show only one topic with a minimum of other detail).
- mixtures of the two, as in the case of a map that emphasizes a single topic such as nuclear power plants but also shows some roads, cities, rivers, or other reference information.
- badly designed maps, with symbols that are unclear and information that is unnecessary.

Since this is a rather basic skill, it is probably better to choose clear examples that are fairly easy to distinguish (not too many examples in the last category on the list above!) Many of the transparencies in the rest of this book are about choosing appropriate map symbols to express particular ideas. Cartographic literacy is not as easy to learn as some seem to think (why else would we see so many juicy examples of terrible map design in newspapers and magazines?)

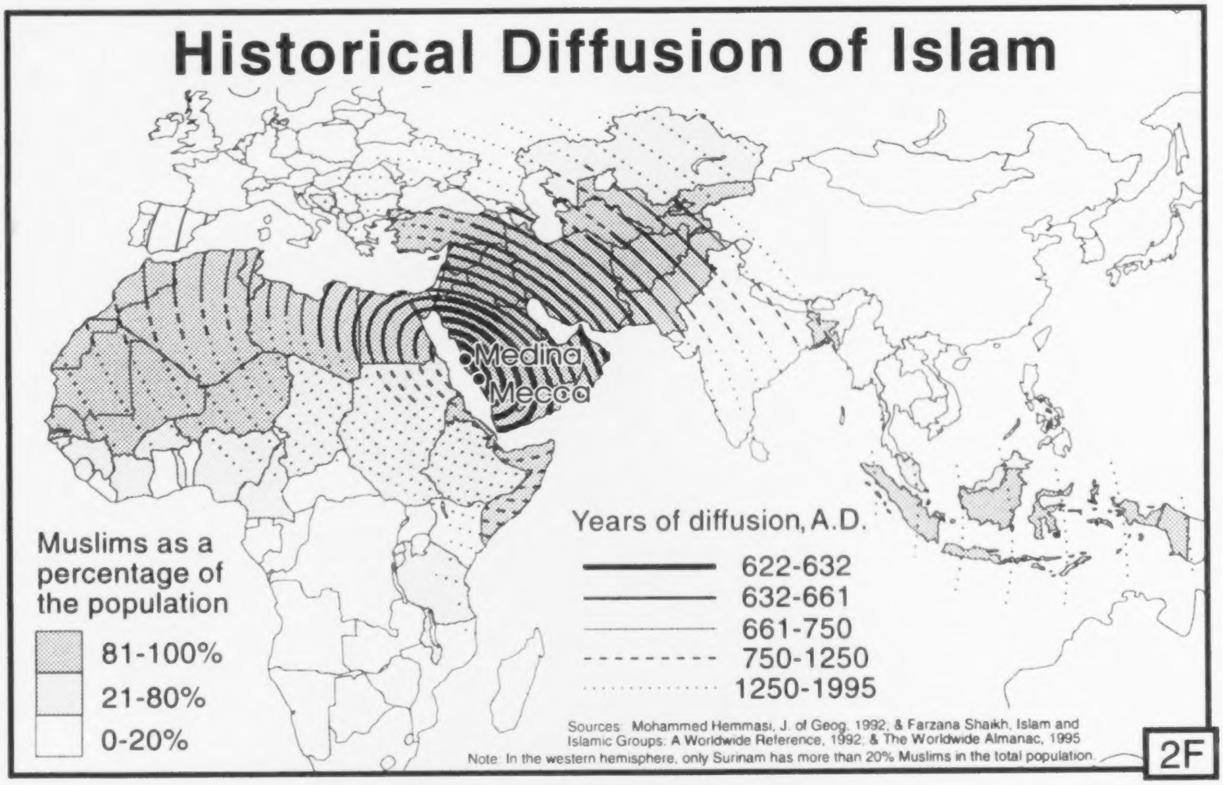
Map of Bosnia


SERBIA
CROATIA
CROATIA
BOSNIA-HERZEGOVINA
Krajina
Sava River
Bosna River
Drina River
Cazin
Bihac
Banja Luka
Tuzla
Lukavac
Zenica
Vitez
Busovaca
Srebrenica
Zepa
Visegrad
Gorazde
Foca
Sarajevo
Konjic
Mostar
Trebinje
Dubrovnik
Split
Sinj
0
25
50
Miles
Pre-war
War
Croatia
Croatian Control
Serbia
Serbian Control
Bosnia-Hertze-govina
Bosnia/Croatian Control
Rivers
Roads
Railroads
Political Boundaries
Towns
Airports
U.N. Peace-Keepers
Capitol City
Mountains

Source: U. S. News & World Report December 19, 1994

2E

Historical Diffusion of Islam


Medina
Mecca
Muslims as a percentage of the population
81-100%
21-80%
0-20%
Years of diffusion, A.D.
622-632
632-661
661-750
750-1250
1250-1995

Sources: Mohammed Hemmasi, J. of Geog. 1992, & Farzana Shaikh, Islam and Islamic Groups: A Worldwide Reference, 1992, & The Worldwide Almanac, 1995

Note: In the western hemisphere, only Surinam has more than 20% Muslims in the total population.

2F

TEACHER'S GUIDE FOR TRANSPARENCY 2E

A *reference map*, by its very nature, makes it difficult for someone to discern the spatial pattern of a specific feature. The complexity of the legend and the multitude of symbols help to mask the pattern of individual features. This Transparency is just a more complex version of Transparency 2C; 2F is a more complex version of 2D.

Copy a single kind of feature from a complicated reference map.

Activity: ask students to draw an outline about the same shape as the area shown on a reference map, and then try to transfer a single feature from the reference map to their outline map. For example, one student could try to copy all cities in their approximate locations; another could copy rivers; mountain areas; and so forth.

This is called "extracting a theme" from a reference map. In effect, one is taking information from a *reference* map and making a *thematic* map of it. The ability to copy things in their correct relative locations is an acquired skill that is useful for many other purposes. Students should do it many times, in different contexts.

TEACHER'S GUIDE FOR TRANSPARENCY 2F

Many of the skill standards in the National Geography Standards involve selecting appropriate symbols for a specific kind of information and then analyzing the pattern. That is also why so much of this book is about map skills.

Activity: Find a thematic map that uses appropriate symbols:

- **isolines** for climatic data, such as temperature, growing season (Transparency 3J) or dry areas (4J)
- **shading** for surface features, such as glaciers (3L) or malaria (4V)
- **choropleth** maps of ratio (PER) data in political areas, such as farm production per person (1B) or welfare payments per family (4Y)
- **dots** for discrete features, such as plantations (4W), Palestinian settlements (8C), or video rental stores (9A)

Find thematic maps,

cover their legends,

and describe the spatial patterns you see on them.

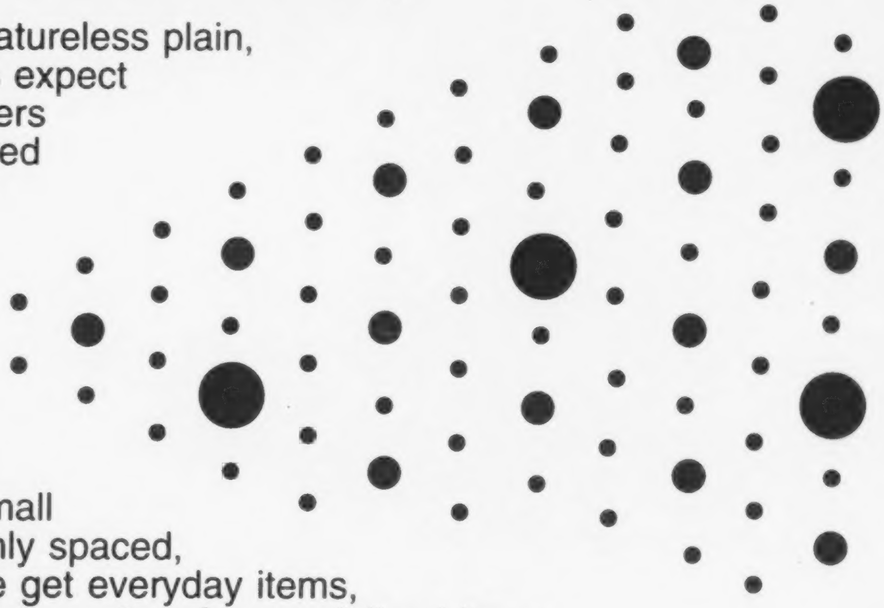
Cover the title and legend. Then post or project the map and ask students to describe the geographic pattern:

- does the feature cover a large or small part of the map?
- does the feature shown on this map occur in a compact area? a long string? many separate areas? is it clustered or dispersed?
- is its general shape round or elongated?
- is it evenly spread or biased on one side of the area?

The goal at this time is pattern recognition and vocabulary building, not accurate taxonomy. We are just starting to explore the uses of pattern analysis. If the discussion leads to questions about the topics of the maps and the causes of the patterns, so much the better. That's what a geography course is about!

Central Place Theory - 1 (in theory)

On a flat, featureless plain, geographers expect service centers to be arranged in a regular pattern,

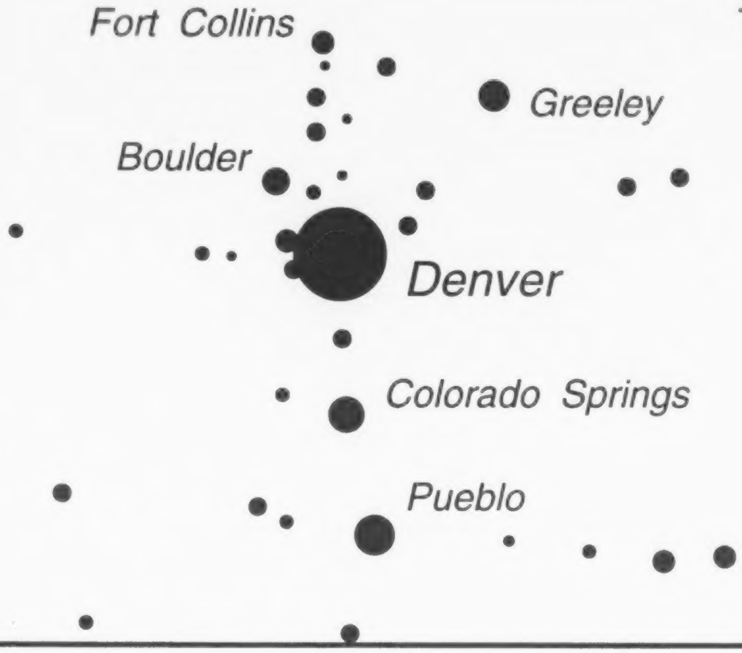


with many small centers, evenly spaced, where people get everyday items, and a few large centers for specialized items.

2G

Central Place Theory - 2 (in the real world)

Things like mountains, rivers, roads, and political borders mess up the pattern,


Fort Collins
Greeley
Boulder
Denver
Colorado Springs
Pueblo

but the basic idea of a hierarchy of urban centers still holds true.

2H

TEACHER'S GUIDE FOR TRANSPARENCY 2G

Geography is about the forces that make a particular place what it is. Most of the time, the focus is on forces from outside the place -- things such as solar energy, ocean currents, immigration, or political influence.

Some of the forces that shape a place, however, are from inside. These are consequences of the everyday actions of the people who live there. For example, if people in an area buy food, then we expect to see markets of some kind there. The size and spacing of stores is one result of the way people buy things -- how often they shop, how far they are willing to travel, and so forth.

Geographers often use an imaginary "flat, featureless plain" to explore the processes that occur when people behave "naturally." (This is not a fictional place -- it is an attempt to see what a real place would be like if it did not have so many complications.) A teacher can do the same kind of thing in a classroom.

Discuss where stores that sell specific things are most likely to be located.

Activity: write a list on the board: a new car, rental video, baseball game, loaf of bread, wedding dress, tank of gasoline, etc. Project the transparency, and ask students where on the flat plain they expect to find stores selling those things. Phrase the question in different ways:

- Would people sell [name a product] in every small town or corner shopping area, or only in big cities or major malls?
- How many places sell new cars, as compared to gasoline?
- How far do people seem to be willing to travel in order to rent a video, or to attend a baseball game?
- How many grocery stores can one soft-drink-bottler serve?
- How many cancer hospitals are there, as compared to dentists?

What do all these questions have in common? They nibble around the fact that some products and services are needed often (e.g., gas stations or video-rental places), and others are inherently specialized and needed less often (e.g., cancer clinics or wedding-dress stores). The former can be found in many places close to customers. The latter are only in a few places, usually in large centers with enough people to support the providers.

TEACHER'S GUIDE FOR TRANSPARENCY 2H

Putting the abstract idea of transparency 2G into the real world is the next step.

Compare maps of town sizes with maps of other features,

to find reasons why towns are arranged that way.

Activity: have students look at maps of Colorado in an atlas or encyclopedia.

- What accounts for the north-to-south line of fairly large cities, from Fort Collins to Pueblo? [They are all right at the eastern edge of the Rocky Mountains.]
- How about the line east from Pueblo? [They are along the Arkansas River (ARKansaw here, ArKANsas in Kansas!).
- Why is Denver the biggest city? [Perhaps it started soonest? Maybe because it is near the center of the settled area? Maybe its river is the biggest? That is important in a dry region!]

Activity: have students make similar maps of other areas, in the U. S. or in other countries. What seems to influence the patterns of cities?

Two Ways to Organize a Geography Class

Regionally - from place to place

e.g.
- Equatorial Africa
- The Sahel
- The Sahara
- Egypt
- Arabian Peninsula
- . . .

Topically -- from idea to idea

e.g.
- Climate
- Agriculture
- Industry
- Urbanization
- . . .

Source: Gersmehl and Rohde, 1994

2I

An Organizing Matrix

because the world is too big to study everything

Within each regional unit, we will focus on a few specific topics. (or vice versa)

	Population and Resources	**Population Growth**	**Sustainable Agriculture**	**Hunger**
East Asia	*minor treatment*	*Major Emphasis*		
SE Asia			*Major Emphasis*	*minor treatment*
South Asia	*Major Emphasis*			
SW Asia	*minor treatment*			*Major Emphasis*
. . .				

Source: adapted from *Geographic Inquiry into Global Issues* (GIGI)

2J

TEACHER'S GUIDE FOR TRANSPARENCY 2I

This transparency might be useful early in a course.

Use in class?

Activity: explain different ways of organizing a course, and then ask students whether the textbook is organized topically, regionally, or as a combination of the two.

maybe;

Talking about course organization is one way to remind students of the purpose of geography -- to answer two questions: "why are things where they are?" and "where should things be put in order to be efficient and fair?" The first question implies a regional organization of a class; the second phrasing is more topical.

maybe not;

If you have already discussed climate a little, show the transparency and ask students why it might be a good idea to start at the Equator with a regional organization (or with climate in a topical organization). The goal is to get students to admit that there may be several equally valid ways of organizing a class. Once they admit that, they will be more willing to give a particular organization the benefit of the doubt.

but use in curriculum meetings?

yes.

The transparency may be even more useful, however, in discussions with parents, administrators, and colleagues. We made it for the 1992 ARGUS meetings. The topic was supposed to be editorial details, but people kept trying to reopen basic questions that had been "settled" at previous meetings. The blunt fact is that the organizational framework of a geography class does not matter nearly as much as the content that is poured into it.

TEACHER'S GUIDE FOR TRANSPARENCY 2J

Once a course framework is set, one must decide how to fit the major theories and regions in it. One useful way is to make a matrix like this Transparency, which is adapted from part of the outline of GIGI (Geographical Inquiry into Global Issues), a well-structured geography course. A matrix like this allows someone to see at a glance whether coverage of topics and regions is reasonably thorough. This kind of careful planning is necessary, because, as the transparency says, "the world is too big to study everything."

That observation ("the world is so big") does not give us a license to teach whatever we want. Society still expects a geography class to "cover" the major world regions (or at least equip students to learn about them on their own).

The prescription is simple: insist on seeing a matrix of this kind from every textbook manufacturer. In time (with luck!), they'll get the hint: teachers expect book companies to show evidence of having thought about relationships between topics and regions in their product. The alternative is the kind of cheap educational schlock that often floods a new market. Teachers deserve better.

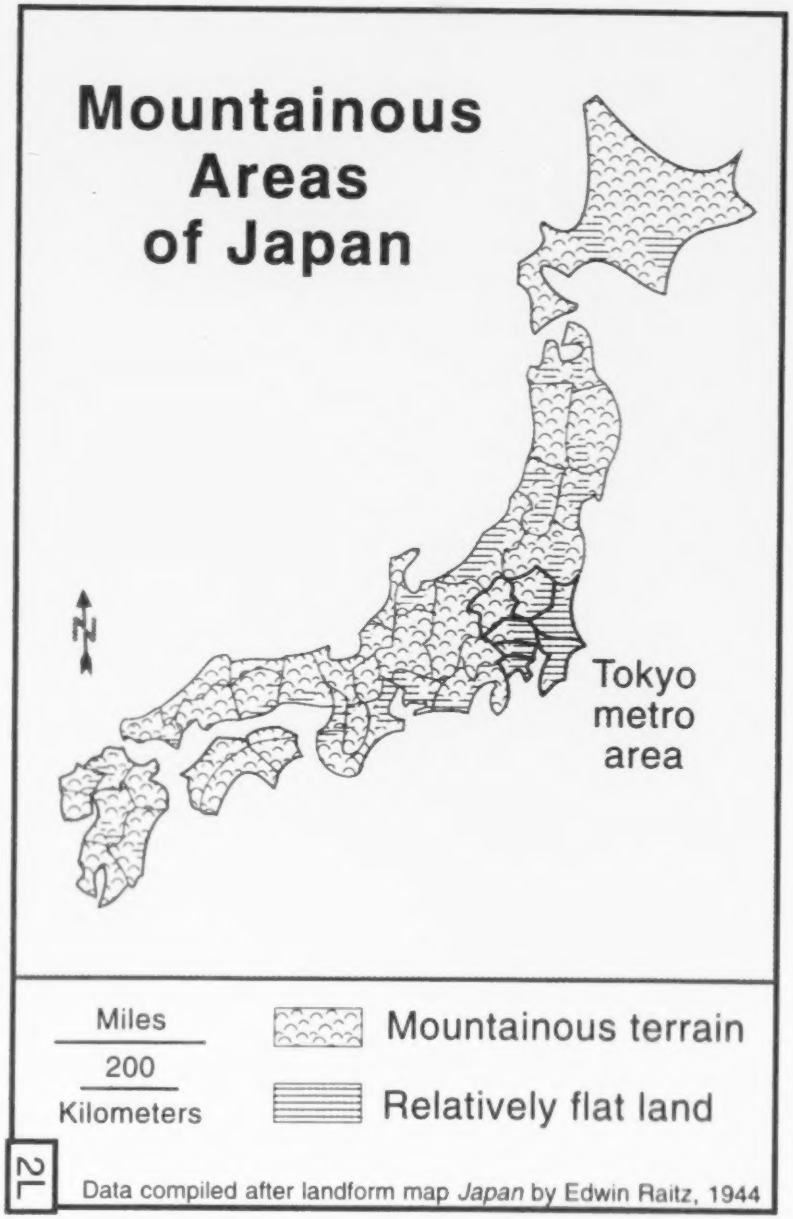
Suggest some preposterous locations for things;

if students see the humor, they're already doing geography.

Activity: Students can learn from the effort of trying to figure out which region is a good setting in which to discuss a particular topic. For example, one can ask "absurd" questions and check student reaction:

- Would it make sense to discuss farming in a unit on Antarctica?
- How about a book with a discussion of the economics of oil production in a chapter on New England?

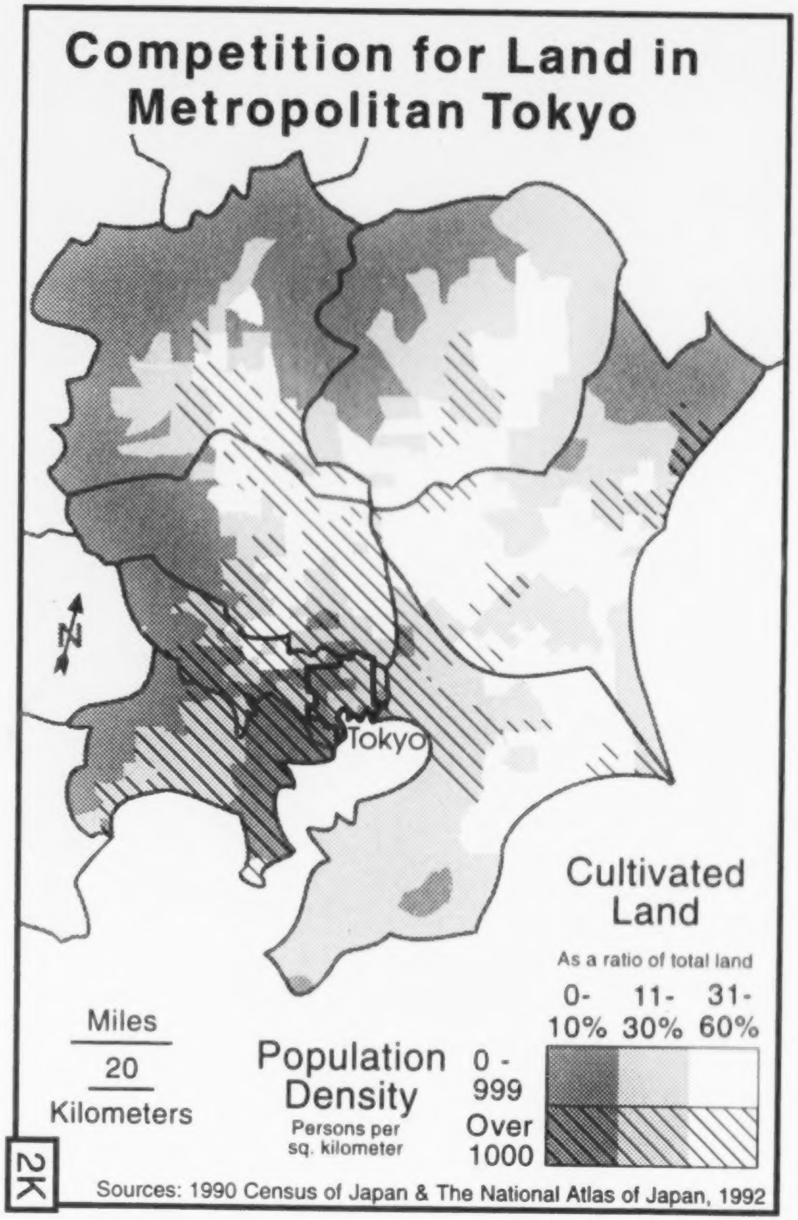
If students laugh at the folly of such suggestions, that is a definite step in the right direction! They are showing a grasp of the idea that the world has some "spatial logic:" that there are reasons why things are where they are.



Mountainous Areas of Japan

Tokyo metro area
N
Miles
200
Kilometers
Mountainous terrain
Relatively flat land
2L

Data compiled after landform map *Japan* by Edwin Raitz, 1944



Competition for Land in Metropolitan Tokyo

Tokyo
N
Miles
20
Kilometers
Cultivated Land
As a ratio of total land
0-10%
11-30%
31-60%
Population Density
Persons per sq. kilometer
0 - 999
Over 1000
2K

Sources: 1990 Census of Japan & The National Atlas of Japan, 1992

TEACHER'S GUIDE FOR TRANSPARENCY 2K

Many maps are puzzling to geographers, and we wouldn't have it any other way. Spatial puzzles are what we like to see, and to solve. Some of these puzzles involve the presence of several seemingly incompatible things in the same area. This kind of puzzle often appears on reference maps, because the job of that kind of map is to show the relative locations of a variety of things in an area. In this Transparency, for example, it is puzzling to see so much land devoted to farming near the middle of one of the largest urban areas in the world. One would think that urban land is so valuable that people would replace the farm fields with buildings or roads. Clearly, this has not happened in many parts of Tokyo. Searching for an answer to that kind of puzzle often involves looking at a thematic map such as Transparency 2L.

Examine reference maps and make lists of features that always, sometimes, and seldom occur together.

Activity: Find some reference maps and have students make three lists:

1) Pairs of features that occur next to each other most of the time (dams and reservoirs on a road map of Texas, trees and steep slopes on a topographic map of Kentucky, castles and good views of the Rhine on a tourist map of Germany, anthills and baobab trees on an environment map of Kenya, etc.)
2) Pairs of features that sometimes occur together and sometimes not (temple ruins and orchards in Greece, coal mines and steel mills in Pennsylvania, gambling casinos and pueblos in New Mexico, beaches and military bases in Hawaii, etc.)
3) Pairs of features that almost never occur next to each other (shopping centers and sewage treatment plants in Los Angeles, tall buildings and weak rocks in New York City, sandy soils and rice fields in China, etc.)

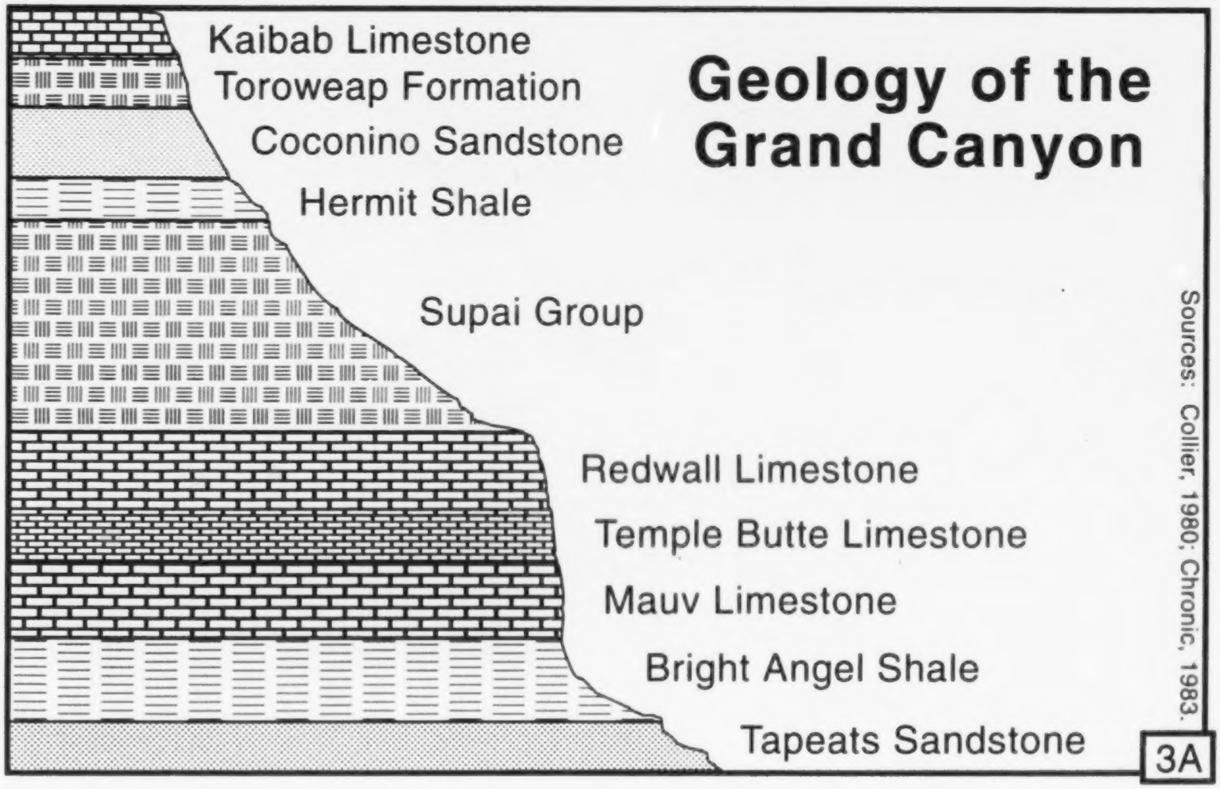
With practice, a geographer gets quite good at making these kinds of lists almost subconsciously, because they are such an important kind of raw material for further geographical inquiry.

TEACHER'S GUIDE FOR TRANSPARENCY 2L

The puzzle on a thematic map is to figure out why a given feature occurs in some places and not in others. Japan is located near a major plate boundary; its frequent earthquakes and volcanoes (such as Mt. Fuji) are consequences of that geographic location. As a result, the country is rugged and mountainous, with relatively little flat land. Most of the flat areas are on the floodplains of a few major rivers. These floodplains are by far the best land for farming, and they are also the sites for the first big cities. As the cities expanded, the amount of farmland began to shrink, because there is not much suitable land anywhere else in the country. Urban expansion could eventually result in the elimination of farmland. The people of Japan, however, feel very strongly that they must be self-sufficient in rice production. They do not want to depend on any other country for such a vital commodity. For that reason, they have tax provisions and other subsidies to allow farmers to operate even within the major cities.

Study a thematic map and speculate about reasons.

Activity: Look at a thematic map of world earthquakes. Trace the plate boundaries and note the association of earthquakes and volcanoes with these breaks in the earth's crust. Notice how an exploration of a spatial pattern on a thematic map has led to a reference-map style of analysis of the features that tend to occur together. The scissors at work!

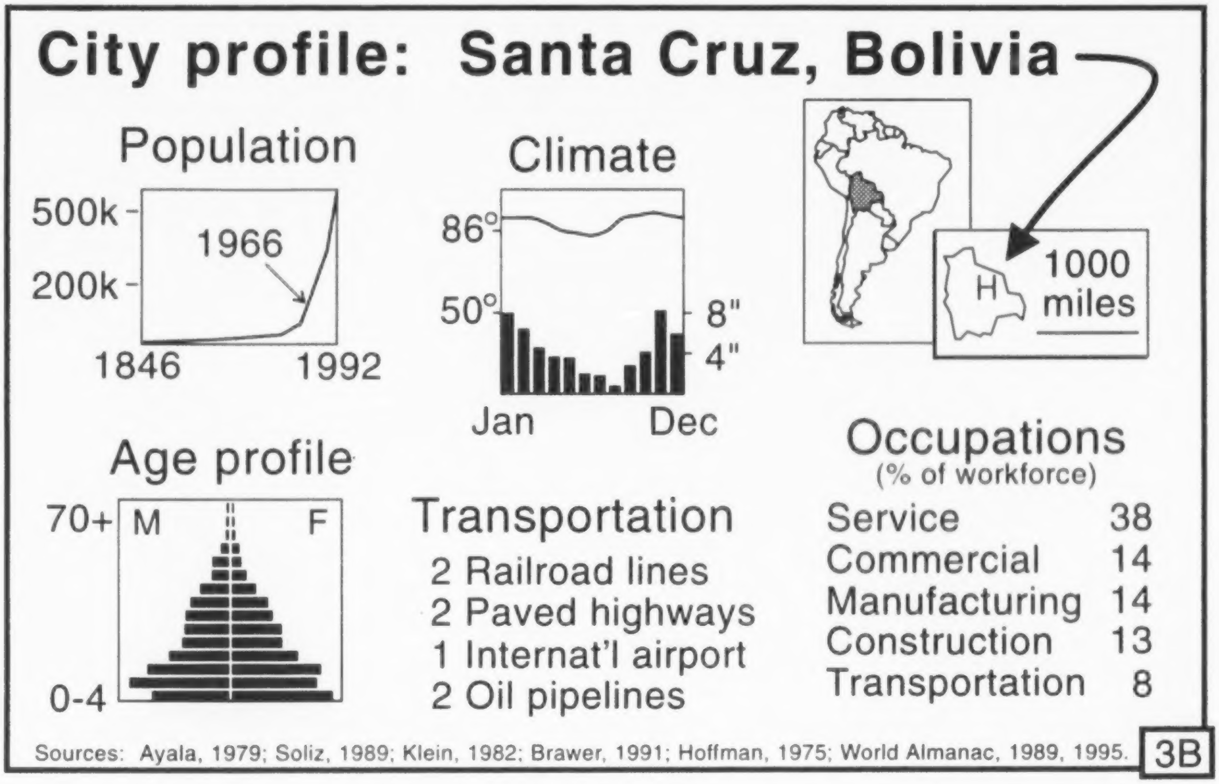


Geology of the Grand Canyon

Kaibab Limestone
Toroweap Formation
Coconino Sandstone
Hermit Shale
Supai Group
Redwall Limestone
Temple Butte Limestone
Mauv Limestone
Bright Angel Shale
Tapeats Sandstone

Sources: Collier, 1980; Chronic, 1983.

3A



City profile: Santa Cruz, Bolivia

Transportation

2 Railroad lines
2 Paved highways
1 Internat'l airport
2 Oil pipelines

Occupations
(% of workforce)

Service	38
Commercial	14
Manufacturing	14
Construction	13
Transportation	8

Sources: Ayala, 1979; Soliz, 1989; Klein, 1982; Brawer, 1991; Hoffman, 1975; World Almanac, 1989, 1995.

3B

TEACHER'S GUIDE FOR TRANSPARENCY 3A

The shape of the Grand Canyon is a classic example of the effects of *differential erosion*. That is admittedly a junior-high-or-higher term for the fact that different kinds of rock have different degrees of resistance to the effects of wind and rain. The concept is important: it helps explain the locations of many things, including large plantations (Transparency 4X) and Harpers Ferry (Transparencies 1C and 6F). Obviously, the vocabulary should be simplified for early grades. How?

One common practice is to refer to the cliff-forming rocks as "hard" and the easily eroded rocks as "soft." This solution is less than ideal, however, because the terms "hard" and "soft" have another meaning in geology. They refer to the *scratchability* of a mineral. Diamond is hard because it can scratch any other mineral; calcite is soft because it can be scratched by most other minerals.

Arrange minerals in order of hardness

(it's about observation).

Activity: bring samples of minerals into the classroom, and have students arrange them in order of scratchability.

Here is the problem: calcite is a soft mineral, but the calcite-based Redwall Limestone is a strong rock. It is therefore a cliff-making layer in the Grand Canyon. Quartz, by contrast, is a hard mineral. It can scratch even tempered steel, but a sandstone made of weakly cemented quartz is not a resistant rock.

This is enough to make some university teachers wish that all educators had to take something like the doctor's Hippocratic Oath: "above all, do no harm." Almost any topic can be grasped at almost any grade level, if packaged properly. The "packaging" must be done knowledgeably, however, so that children do not acquire erroneous images and concepts that must be "unlearned" later.

For the record, then: the Grand Canyon has some strong and some weak rocks, which account for the cliffs and gentle slopes in its profile. It also has some hard and some soft rocks, but hard rocks are not necessarily strong, nor are soft rocks necessarily weak.

TEACHER'S GUIDE FOR TRANSPARENCY 3B

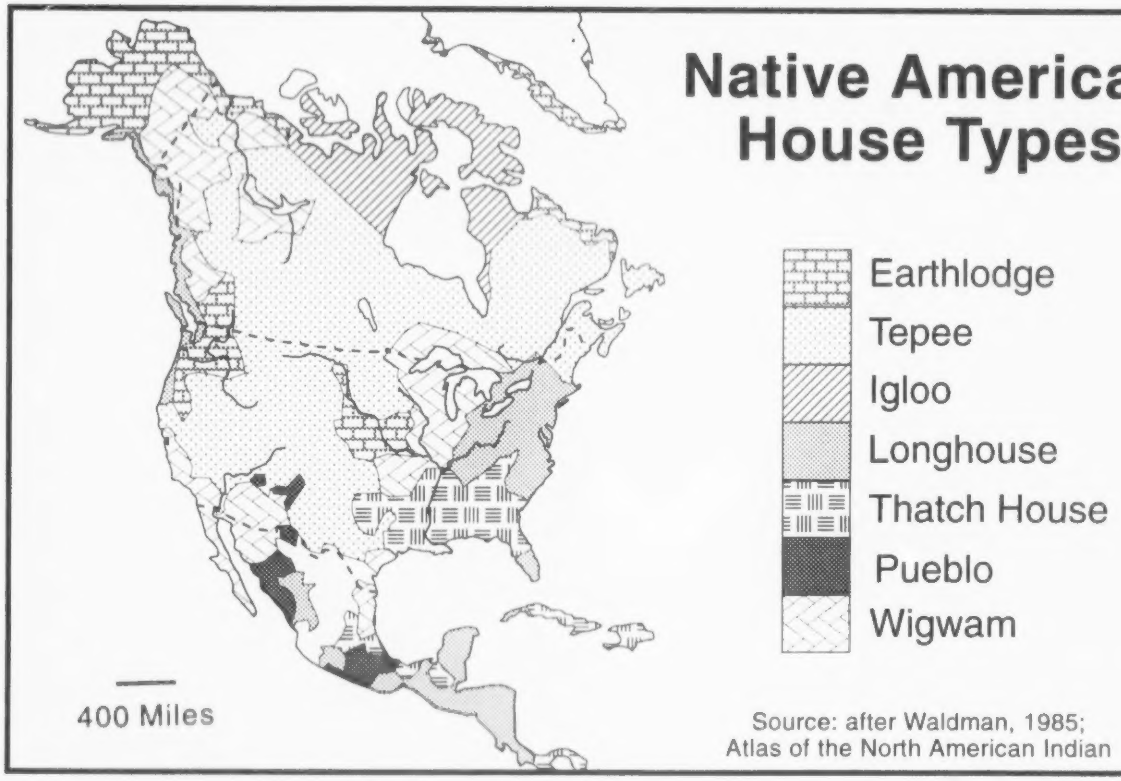
A visit to (or from) the local Chamber of Commerce can illustrate an important form of applied geography. Most Chambers have a printed community profile to give to people who are interested in "what makes a community tick." These may be called *town profiles, county summaries, annual reports*, or *relocation packets* (because the main consumers of the information may be factory owners, office builders, vacationers, or people who are considering moving to the area).

Activity: have students make one-page profiles of places and post them for comparison. Doing this early in a term, without much guidance, and then later can provide gratifying feedback about increased ability to "do geography." This transparency can be set up as an example to be improved, not emulated (see Transparencies 7D and 7E). Suggest that "this is the old version, and we want to replace it with something that does a better job of attracting attention and presenting our community."

Make a profile of a community to explain what "makes it tick."

Like all short profiles, the Santa Cruz example shows information selectively. The population graph shows rapid growth after 1966, but it does not say that the growth was fueled by an oil boom. Only by noting pipelines in the transportation section could someone guess the importance of oil in the local economy. The profile also fails to note farming in the surrounding area (let alone the thriving cocaine industry!). Bottom line: target the profile at a specific audience by anticipating the questions they would like to see answered.

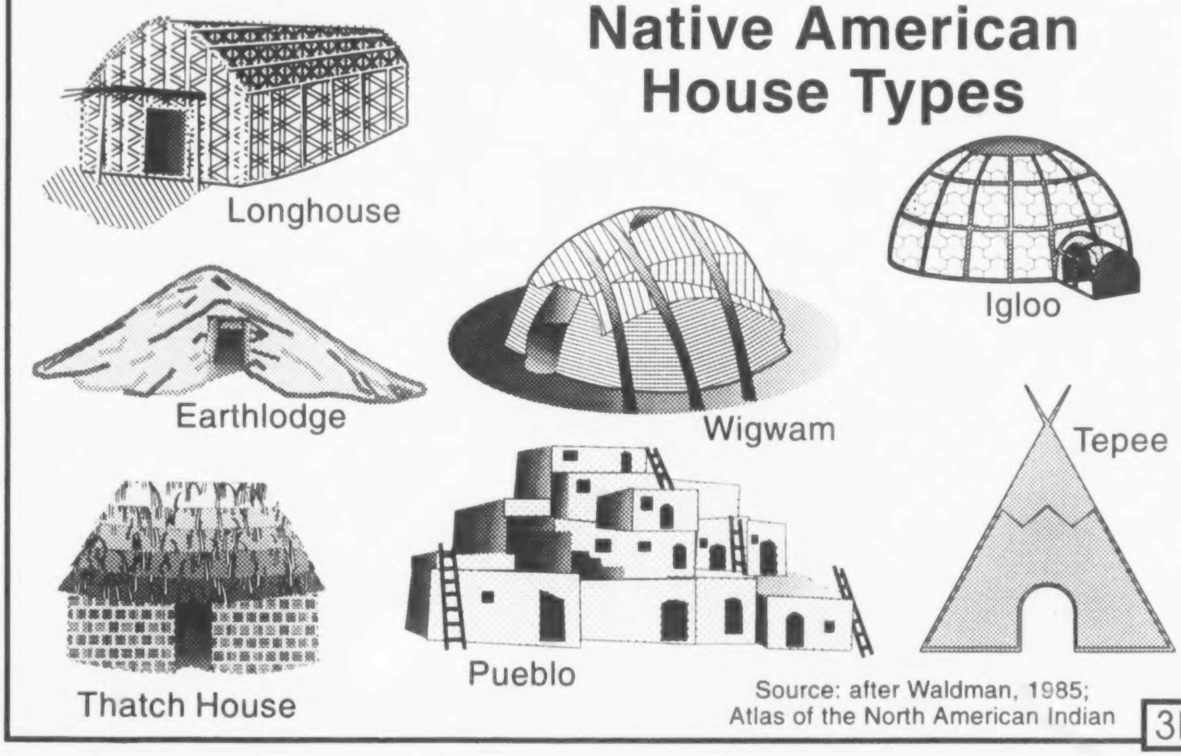
Native American House Types


Earthlodge
Tepee
Igloo
Longhouse
Thatch House
Pueblo
Wigwam
400 Miles

Source: after Waldman, 1985;
Atlas of the North American Indian

3C

Native American House Types


Longhouse
Igloo
Earthlodge
Wigwam
Tepee
Thatch House
Pueblo

Source: after Waldman, 1985;
Atlas of the North American Indian

3D

TEACHER'S GUIDE FOR TRANSPARENCY 3C

This is an example of a *bounded-area* map. A mapmaker looked at the world, decided where a particular feature was common, drew a line around those places, and shaded the area in a distinctive way. A bounded-area map is visually similar to but not quite the same as an *isoline* map (Transparencies 3J, 3K, and 4U) or a *choropleth* map (Transparencies 1A, 1B, and 4Y).

Isoline and choropleth maps are used for quantitative information, such as temperature or population density, which is measured on a scale from low to high. Bounded-area maps, by contrast, are used for qualitative information, which is different in kind but not in degree. For example, the Bantu language is different from Swahili, but not higher or lower.

This basic difference in the nature of data should be reflected in the legend and the choice of colors. Colors on an isoline or choropleth map should go in a logical sequence (e.g., from light to dark), because the data go from low to high. Colors on a bounded-area map should not imply a sequence, because one category is not lower or higher than another.

Post maps,
and classify them
according to their
"graphic vocabulary."

Activity: have students gather maps and classify according to "graphic vocabulary." Don't expect this skill to be mastered in one class, or even a year. The language of maps, like any language, has many levels of meaning. Mastery begins with the realization that people invented different symbols to express different ideas.

TEACHER'S GUIDE FOR TRANSPARENCY 3D

A house is a tangible expression of a family's dreams and personal history. It tells something about available technology, family income, and aesthetic ideas. In short, a house is a landscape feature that provides an interesting commentary on many other aspects of the local environment and culture. Part of this Activity is simple vocabulary-building -- learning words to use in describing a house.

Write a description
of a house, as if
you were setting
a scene in a novel.

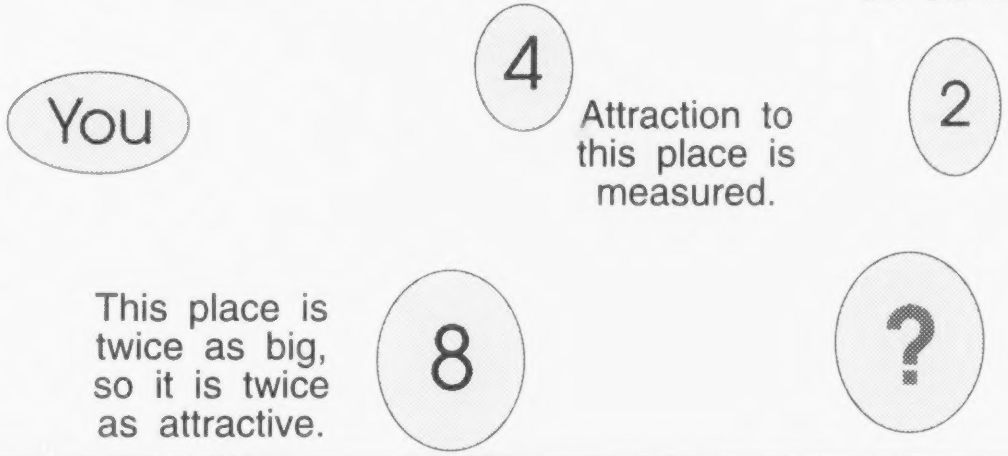
Activity: Have students write a short verbal description of one of the houses on this Transparency, without title or other clues about which house is being described. Trade descriptions with other students, who try to figure out which house is being described. If that seems too mundane, have them imagine that they are writers trying to describe the setting for a mystery novel. Descriptive writing is a skill that can be sharpened. Moreover, this sword cuts both ways: a person skilled in descriptive writing usually is good at evaluating other written work. That is why we hear so much about writing across the curriculum!

Sketch a house,
label key features,
and explain how
they are adapted
to the environment

Activity: Have students sketch one of the houses and label key features. Like any vocabulary-building activity, this can have different levels of complexity in different grades. For example, a beginning student may notice only the conical shape of a wigwam or tipi. A more advanced student might notice the skin cover and framework of poles, which allow the house to be taken down and moved more easily than other house types. A still more advanced student might notice the air deflector that keeps wind from blowing into the smoke hole near the top. When they have labelled their sketches, have them write an essay describing how those features fit local environmental conditions.

The Gravity Model - simple

Your attraction to a place depends on its size and its distance.



This place is twice as far, so it is half as attractive.

Attraction to this place is measured.

This place is twice as big, so it is twice as attractive.

3E

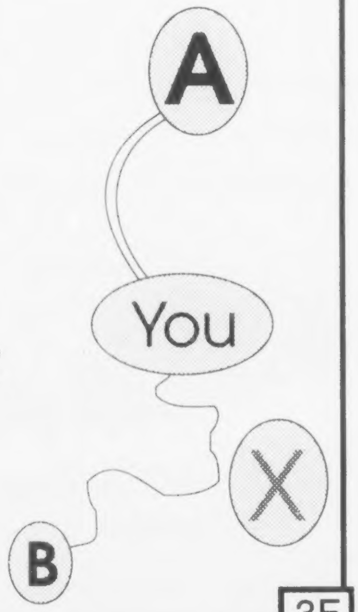
The Gravity Model - complex

Things that tend to increase traffic:

- larger destination
- larger origin
- family ties
- economic links
- political connections

Things that tend to decrease traffic:

- greater distance
- rugged terrain
- bad roads
- closer places to get what you want



3F

TEACHER'S GUIDE FOR TRANSPARENCY 3E

The gravity model is a theory that tries to predict the traffic we expect on one road if we know the traffic on another. Ask students if they have seen the rubber cables that engineers use to count cars on a road. These are costly -- it is cheaper to measure a few roads and predict the rest rather than measure every road.

Like any theory, the gravity model starts with some assumptions. The main assumption is that in the aggregate people behave in a predictable way (even though individual people act independently). Suppose we measure the traffic on the road from "you" to one town (the one marked 4, which could mean 400 cars per hour or 4000 telephone calls per day or some other measure of traffic).

The gravity model says traffic is directly related to population; it predicts twice as much traffic to a town that is twice as big. It also says traffic is inversely related to distance; it predicts half as much traffic to a town that is twice as far away. What traffic would you predict to the question-mark town (it is twice as big, and twice as far, so the traffic is likely to be 4 times 2 divided by 2, or about the same as to the measured town).

What about a place six times as big and one-half as far away? 4 times 6 divided by 1/2, for a whopping 48. (Lookee, it's a math-across-the-curriculum activity!)

Use the gravity model to predict traffic between specified towns.

Activity: put this in the real world. Pick a well-known town near the school. Then pick some other towns with sizes and distances that are even multiples or fractions of that town (e.g., one-third as big, or four times as far away). Have students measure the distances on a road map. Tell them that engineers measured 1000 cars per day on a road to ______; what traffic do they predict to the other towns?

Who cares about this information? The police, highway engineers, bicyclists, anyone who runs a gas station, restaurant, store, or theater; lots of people.

TEACHER'S GUIDE FOR TRANSPARENCY 3F

In the real world, people often have to adjust the results of gravity-model analysis to make them more realistic. These adjustments take into account such factors as congestion, road condition, alternative opportunities, or various kinds of political or economic connections. For example, one could express distance in terms of cost or minutes rather than simply miles.

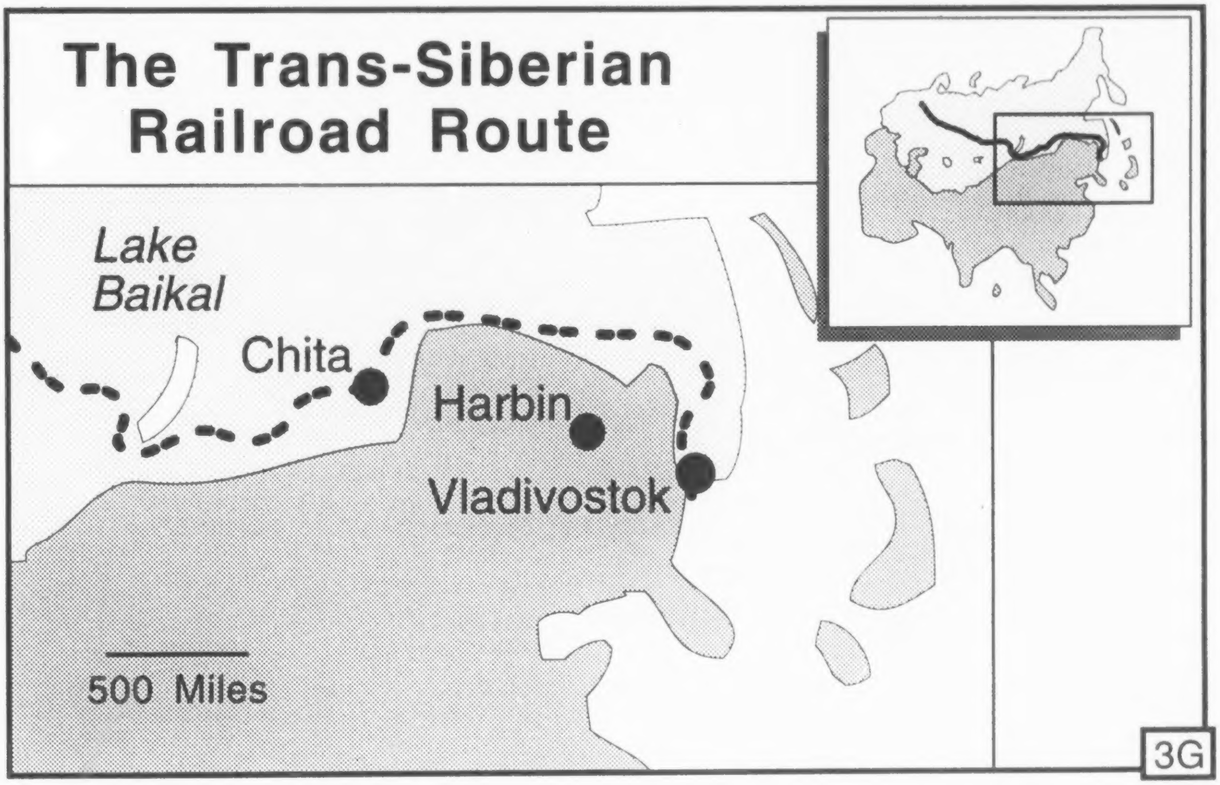
If desired, adjust the predictions to allow for other factors.

This kind of adjustment makes traffic forecasting partly art as well as science. It is a necessary prerequisite, however, to build good infrastructure (whether we are talking about canals, roads, powerlines, telephone wires, bicycle paths, or fiber-optic cables for computers). Traffic prediction is a big career opportunity for geographers. Moreover, citizens who want to participate in decisions about where to locate stores, highways, etc. should know how people predict traffic.

In 1989, for example, the author helped a neighborhood group use this model to predict traffic on a new freeway the city was planning to build. A junior-high student did some of the calculations, and a retired woman presented the results. City officials had to admit that the traffic would cause excessive pollution, noise, and danger to children. They agreed to pay those who wanted to move to other houses. Isn't that what the phrase "geography for life" is all about?

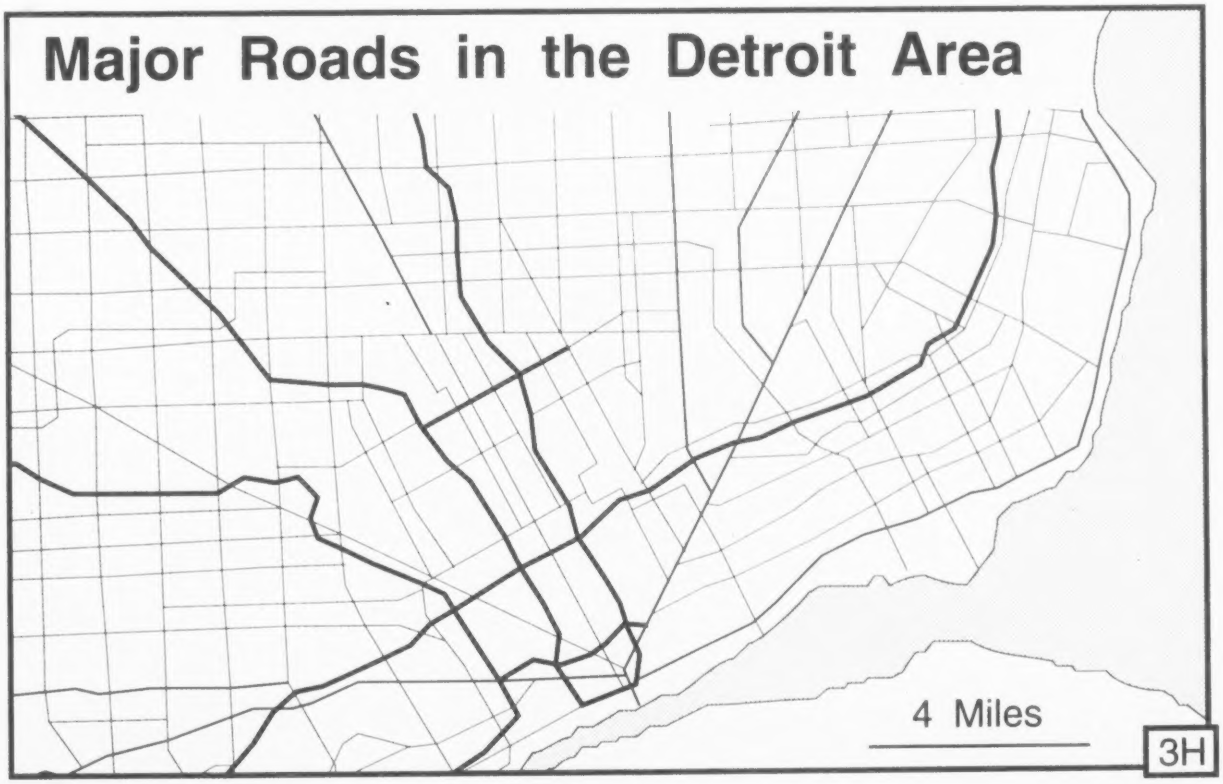
(Of course, people in another place might use the gravity model to argue in favor of a new road connection. The model just predicts traffic; it does not say what people should want).

The Trans-Siberian Railroad Route


Lake Baikal
Chita
Harbin
Vladivostok
500 Miles

3G

Major Roads in the Detroit Area



3H

TEACHER'S GUIDE FOR TRANSPARENCY 3G

The famous Trans-Siberian Railroad links the European part of the former Soviet Union with the port and military base of Vladivostok on the Sea of Japan. The western end of this extraordinary railroad makes a great deal of economic sense.

It starts in the densely populated area near Moscow. The railroad then goes through a long grain-growing region between the Aral Sea desert and the cold forests of Western Siberia. It passes through mineral-rich areas near Novosibirsk and curves south of Lake Baikal. Then, rather than go directly southeast through the well-populated area around Harbin, the railroad makes a big detour northeast, then east through essentially uninhabited area, then south, and finally southwest.

Measure distance in a straight line and along a railroad.

Discuss reasons why railroads do not always go straight.

Activity: measure the distance along a straight line from Chita to Vladivostok and then along the railroad. The railroad is about 600 miles longer than the straight line. This is the "penalty" for trying to stay entirely within one country: every trip takes an extra day and thousands of gallons of fuel. Moreover, the area north of the Amur River has few people. An emergency along that lonely stretch can be a big problem, because there are so few roads or villages there.

Activity: use an atlas and try to find other places where railroads or roads seem to go far out of their way to stay inside of one state or country.

TEACHER'S GUIDE FOR TRANSPARENCY 3H

Detroit was originally a French town. The downtown streets follow the French "longlots." In this system of land division, someone "owns" a certain distance along a river or road. Property lines extend directly away from the river.

Since access to the river was important for transportation, people would divide their land among their heirs by giving each son a share of the "frontage." The results are long, skinny farms oriented at right angles to the river. This pattern is still evident in many places near Detroit. In the Raisinville area, for example, many "farms" are a few hundred feet wide and half a mile or more long.

Try to identify which roads follow various systems of land division;

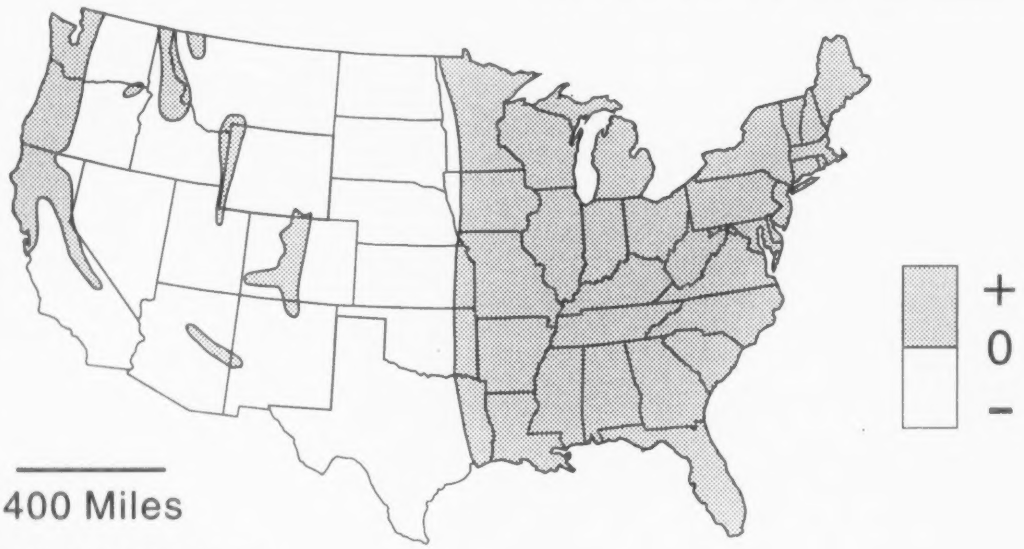
what are some implications for modern traffic?

Activity: look at the map of downtown Detroit. Use one color to trace the roads that follow the Public Land Survey (they are one mile apart and run (roughly) north-south or east-west). Then use another color to mark roads that follow the French longlot rule (they go directly away from the river or parallel to it). Use a third color for *radial* roads that run directly out from downtown. Then, try to figure out what corners are likely to have complicated stoplights and possible traffic jams. [Five-, six-, and more-way intersections are harder to control with traffic lights than a simple four-way stop].

Activity: look at street maps of mid-sized cities such as Dallas, Denver, Indianapolis, Minneapolis, New Orleans, Oklahoma City, Pittsburgh, St Louis, and Salt Lake City. Which cities seem to have traces of old long-lot settlement? [M, N, P, and SL] What other things seem to influence the street patterns of some cities? [Denver and Pittsburgh have mountains; Salt Lake City has both mountains and a big lake.]

Activity: look at street patterns of cities in other parts of the world. Can you see evidence of former land uses (an old fort wall, for example [Edinburgh, Quebec City], or land left over from the palaces of former rulers [Rome, Tokyo]). What influence do these relics of former land use have on present-day traffic patterns?

Moisture Balance

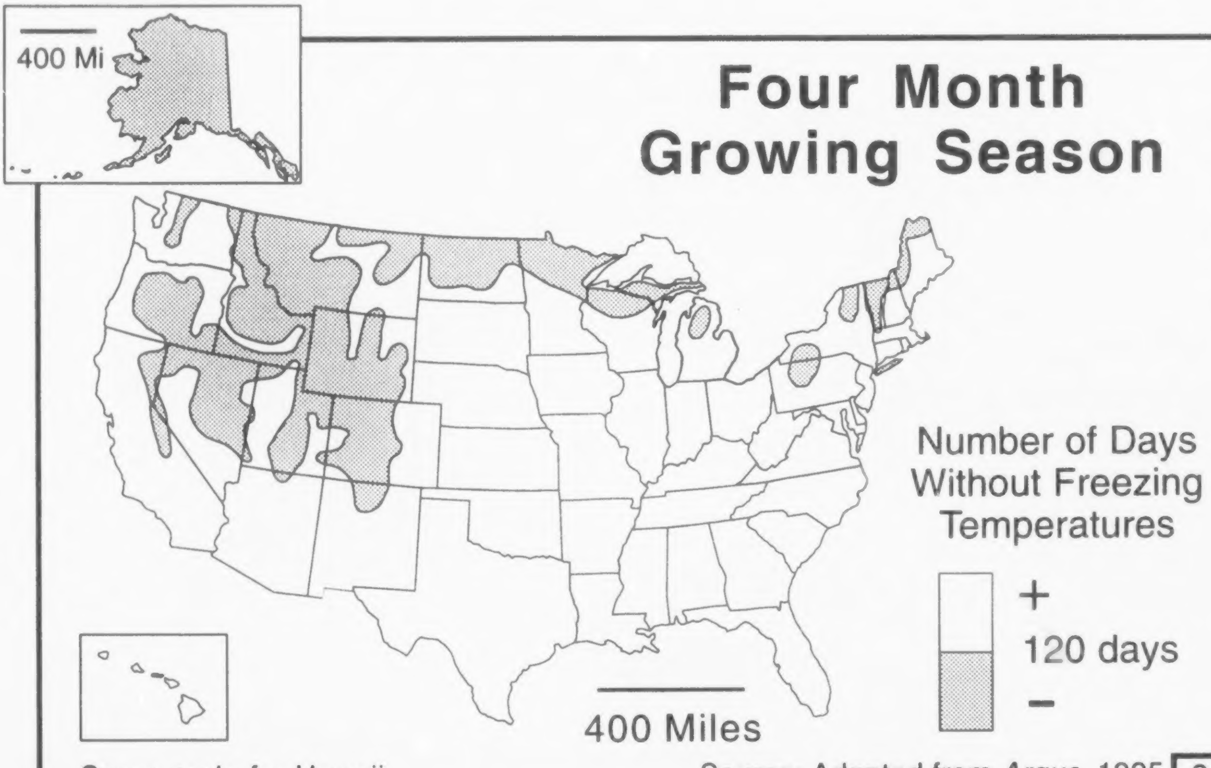


*Available data do not allow Alaska and Hawaii to be shown at this scale.

Source: Adapted from *Argus*, 1995

3I

Four Month Growing Season


400 Mi
Number of Days Without Freezing Temperatures
+
120 days
–
400 Miles

Same scale for Hawaii

Source: Adapted from *Argus*, 1995

3J

TEACHER'S GUIDE FOR TRANSPARENCY 3I

The lines on this map have an important environmental message. On the gray side of the line, rain and snow bring more water than plants can use.

What states have a moisture surplus?

Activity: Color and name the states that have a moisture surplus.

What does a moisture surplus do in the environment?

Activity: Explain the basic idea of the map and then ask students to make a list of things that surplus water "does" in the environment. For example, it grows forests. It makes rivers and lakes. It washes dust and smoke out of the air. It occasionally floods basements. It leaches nutrients out of the soil, so that farmers have to fertilize their fields. It erodes land and makes gullies.

What tools and cultural rules won't work without a moisture surplus?

Activity: Show a picture of a covered wagon and ask students to list things that might be in it. Keep pressing until the list extends beyond household items and includes tools needed to make a living or build a house (e.g., rifle, gunpowder, harness, plow, corn seeds, axe, saw, hammer, nails, thread, matches or flint, well bucket, etc. Then, project the transparency and point out that moisture-deficit areas cannot support forests. Finally, ask students how many of the tools on their list would work if there were no trees around for wood.

In *The Great Plains*, W. P. Webb (a Texas historian) said that European-American culture was not equipped to deal with a treeless environment. As a result, the westward movement of the frontier slowed in the mid-1800s (except for people who leapfrogged the Plains and went on to places like Utah, Oregon, and California -- Transparency 3M). It took time for people to invent (or find) tools to make life in treeless areas easier. This list of new "tools" includes the revolver, sodcutter, steel plow, wheat thresher, longhorn cow, barbed wire, windmill, drilled well, etc Even so, much moisture-deficit land was never claimed and is still "owned" by the Federal government (Transparency 3O).

Discuss what you should pack when you travel to a specific place.

Activity: ask students what they would take with them if they were settlers moving to [name a place and a time]. Discuss the environmental appropriateness of the items on their lists.

TEACHER'S GUIDE FOR TRANSPARENCY 3J

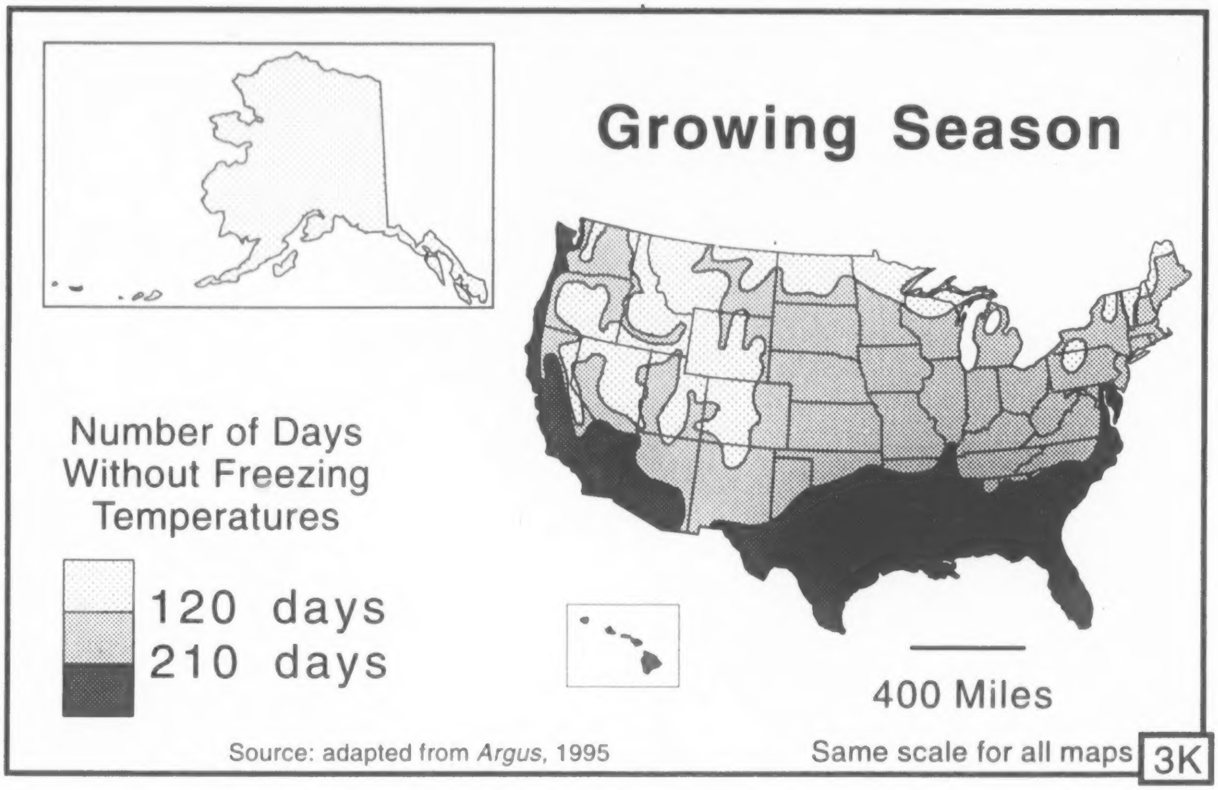
The four-month frost-free season is an even more formidable barrier to human settlement than the moisture-deficit line. Hardly any crop can mature when the growing season is that short. Only a few cultures, such as the American Eskimo and Inuit, the Scandinavian Lapps, or the Yakut people of eastern Siberia can live in lands with such short summers. Their total population probably never was more than that of a medium-sized city such as Baltimore or Seattle.

Find cities that are north of 60 degrees north latitude.

Activity: have students look at a world map or atlas and count cities that are north of about 60 degrees north latitude (maybe put pins in a map?) There are a few lucky places with warm ocean currents, a few mining areas, a few fishing villages, a few prisons and military bases, a few other kinds, but in general this part of the world is uninhabited.

Discuss ways of "solving" dryness or coldness.

Activity: have students think about ways to "solve" the problems of dryness or coldness. [Irrigation from wells or canals, heated greenhouses, seasonal migration] Is it easier to overcome a lack of water or a short growing season? Right -- several cultures learned how to survive in a dry land and even build big cities (such as Los Angeles, Phoenix, or Cairo), but a short frost-free season is still a big barrier.

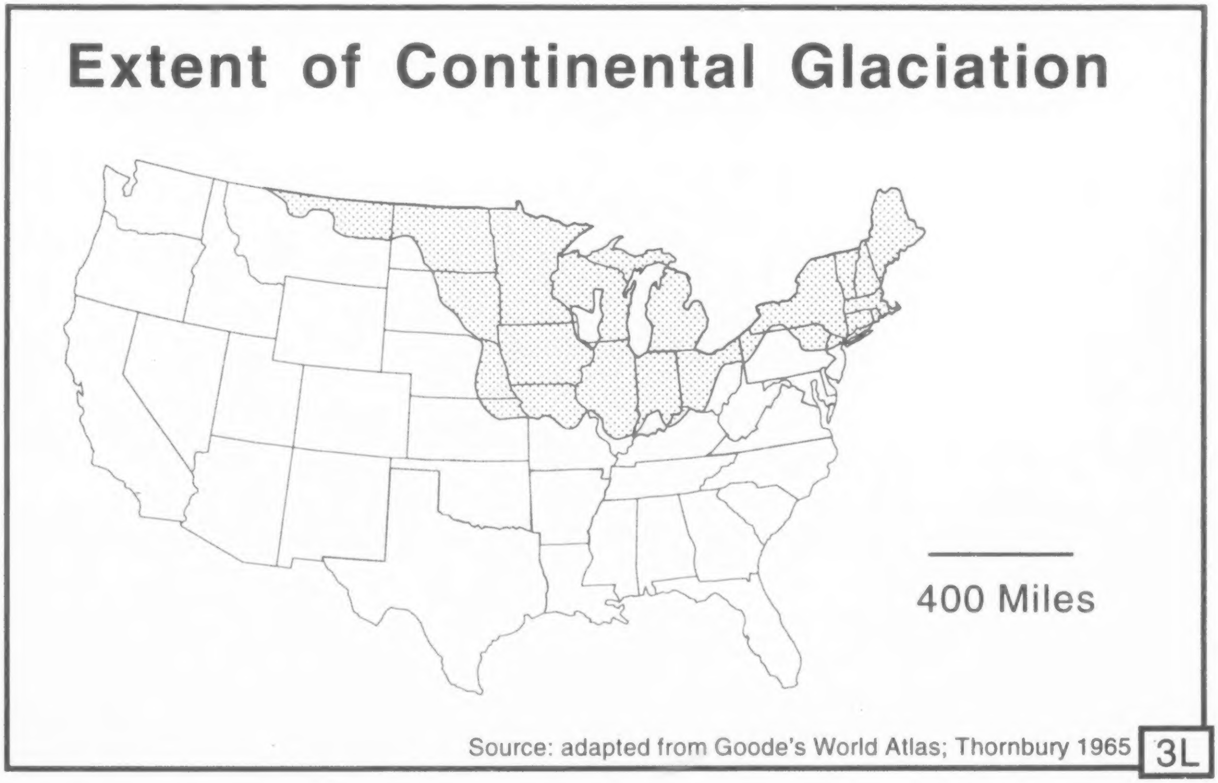


Growing Season

Number of Days Without Freezing Temperatures
120 days
210 days
400 Miles
Same scale for all maps

Source: adapted from *Argus*, 1995

3K



Extent of Continental Glaciation

Source: adapted from Goode's World Atlas; Thornbury 1965

3L

TEACHER'S GUIDE FOR TRANSPARENCY 3K

This map is like Transparency 3J but with more *isolines* (Transparency 4U shows how to make isoline maps). Each isoline represents a frost-free season of a specific length, and it separates places that have a longer growing season from those with a shorter one. Each line has a specific message:

- the four-month line separates the country into places that can grow grain from those that cannot (this is assuming that the places have the other requirements, such as moisture and soil nutrients).
- the seven-month line separates places that can grow cotton and rice from those that cannot. It also separates places where heating is more costly than air-conditioning from where the reverse is true.

Compare maps to identify environmental limits on the plantation economy.

Activity: project the transparency and compare it with Transparency 4W (pre-Civil-War plantations). Ask what seems to be the northern limit of the plantation economy. [the seven-month frost-free season line] Why? [Because plantation-style farming seemed to work best on crops such as rice (South Carolina), sugar cane (Louisiana, with almost a 12-month growing season), or cotton (across the South)]. Continue with Transparencies 3M and 3N if desired, or save them for another day.

TEACHER'S GUIDE FOR TRANSPARENCY 3L

The glacier-limit line is another great divide in the United States.

Activity: ask students what they expect if a mile-thick mass of ice pushed across the land around them:

Discuss what can happen when a thick sheet of ice moves across an area,

- it would get cold,
- many kinds of trees and plants might die, animals might move,
- hills might be worn down, soil scraped away,
- places with weak rocks might be gouged deeper,
- some low places might be filled with soil and rocks that were pushed along by the ice

And when the ice melts?

and when it melts.

- water would fill the low, gouged-out areas,
- rocks and gravel might be left where the ice stopped,
- floods might carry sand and mud somewhere else,
- [this one is a lot more sophisticated, but it is economically important and therefore worth noting for some advanced classes: dust might blow east when winds sweep across places where ice just melted but trees and grass have not covered the ground yet]

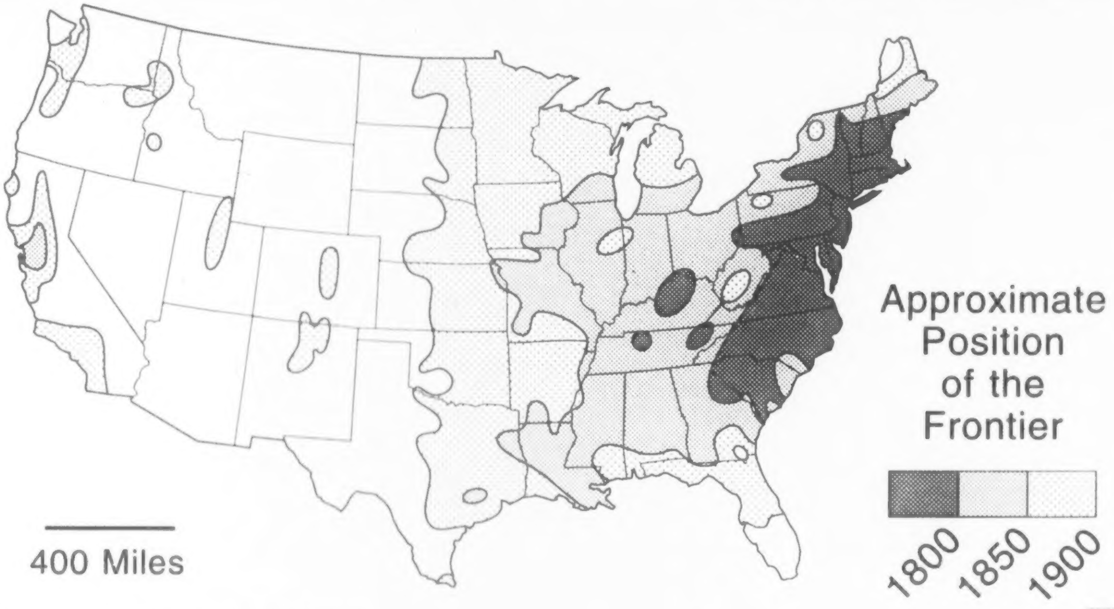
Now, let's put these abstract consequences on a map.

Where would you expect to see those effects?

- What states have a lot of natural lakes and swamps? [Connecticut, New York, Michigan, Wisconsin, Minnesota, North Dakota -- swamps and lakes are good for recreation (and mosquitos) but bad for road building!]
- What states have land that is more fertile because Ice-Age floods and wind brought extra soil into the area? [upstate New York, Illinois, Indiana, Iowa, Ohio; in short, most of the Corn Belt]
- What states have transportation that is easier because hills have been flattened and valleys filled? [ditto]

Limit of "Settlement"

Area with at least six non-native persons per square mile.

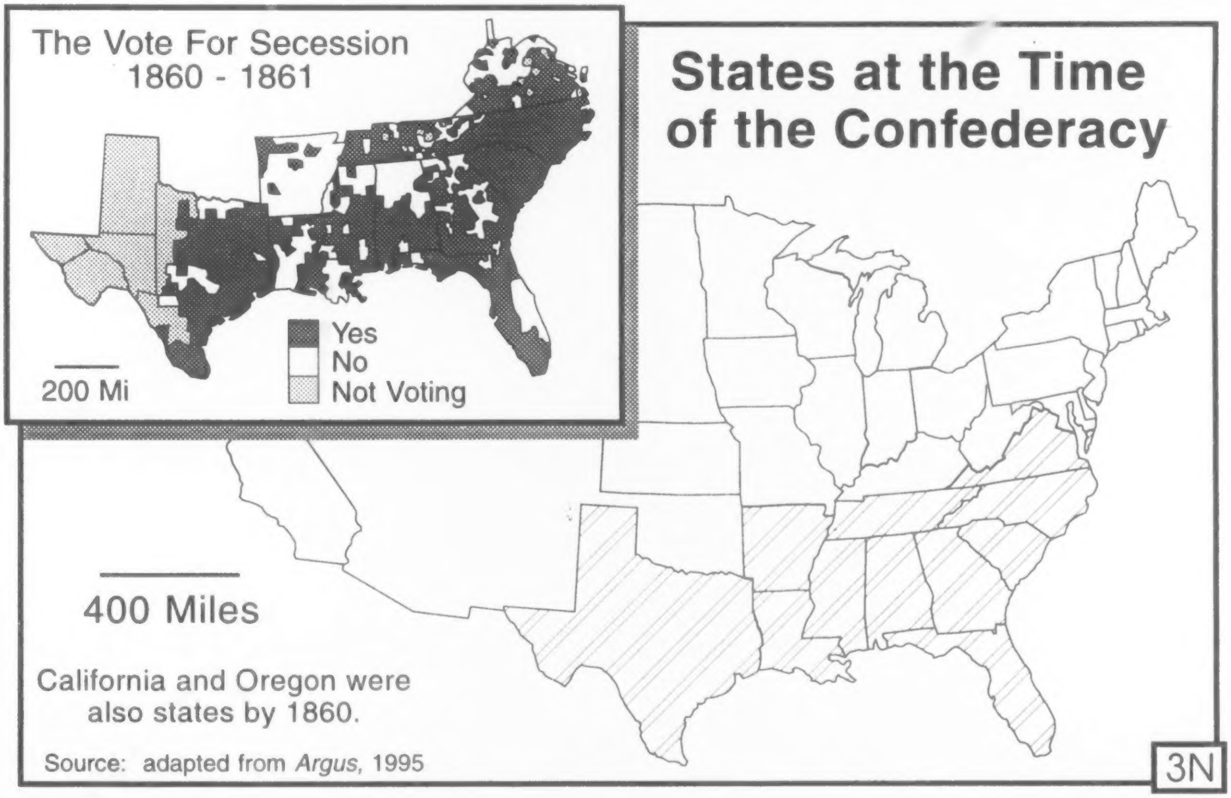


Approximate Position of the Frontier
1800
1850
1900
400 Miles

Source: Bureau of the Census

3M

States at the Time of the Confederacy



The Vote For Secession 1860 - 1861
Yes
No
Not Voting
200 Mi
400 Miles

California and Oregon were also states by 1860.

Source: adapted from *Argus*, 1995

3N

TEACHER'S GUIDE FOR TRANSPARENCY 3M

The position of the settlement frontier at a particular moment in history had a strong influence on the kind of people who moved to a particular place, the kind of economy they started, the kind of houses they built, and so forth.

When did this area get its first European settlement?

Activity: Point to a specific place on the map, and ask students when that area got its first immigrants from Europe, Africa, or Asia. Compare that data with a graph of immigration patterns (any good history text should have one; Activity CX of ARGUS provides data; the National Geographic Society's *Historical Atlas of the United States* has a good graph; and the *Historical Statistics of the United States*, from the Superintendent of Documents, Washington, DC 20402, has good data).

What kind of immigrant people likely moved to that area first? [Spanish to Texas, New Mexico, and California; British to New England, Scots-Irish to Appalachia, British and African to the plantation areas of the South; German and Scandinavian to the Great Lakes region; East European to the Great Plains and the mining/steelmaking regions of New England or Appalachia; Chinese and other Asian peoples to the railroad and mining towns of the West.]

What consequences can we still see? styles of architecture, festivals, foods, church denominations, and so forth. This is the kind of topic that can be introduced in early grades and reviewed often as students slowly refine their ability to link historic events with present-day landscapes in specific places. This map is a key to making that link; it can be used a dozen times!

TEACHER'S GUIDE FOR TRANSPARENCY 3N

This transparency shows a geographic pattern that is both effect and cause: it is the consequence of powerful forces, and at the same time it is an underlying cause of some persistent features of American geography, sociology, and politics.

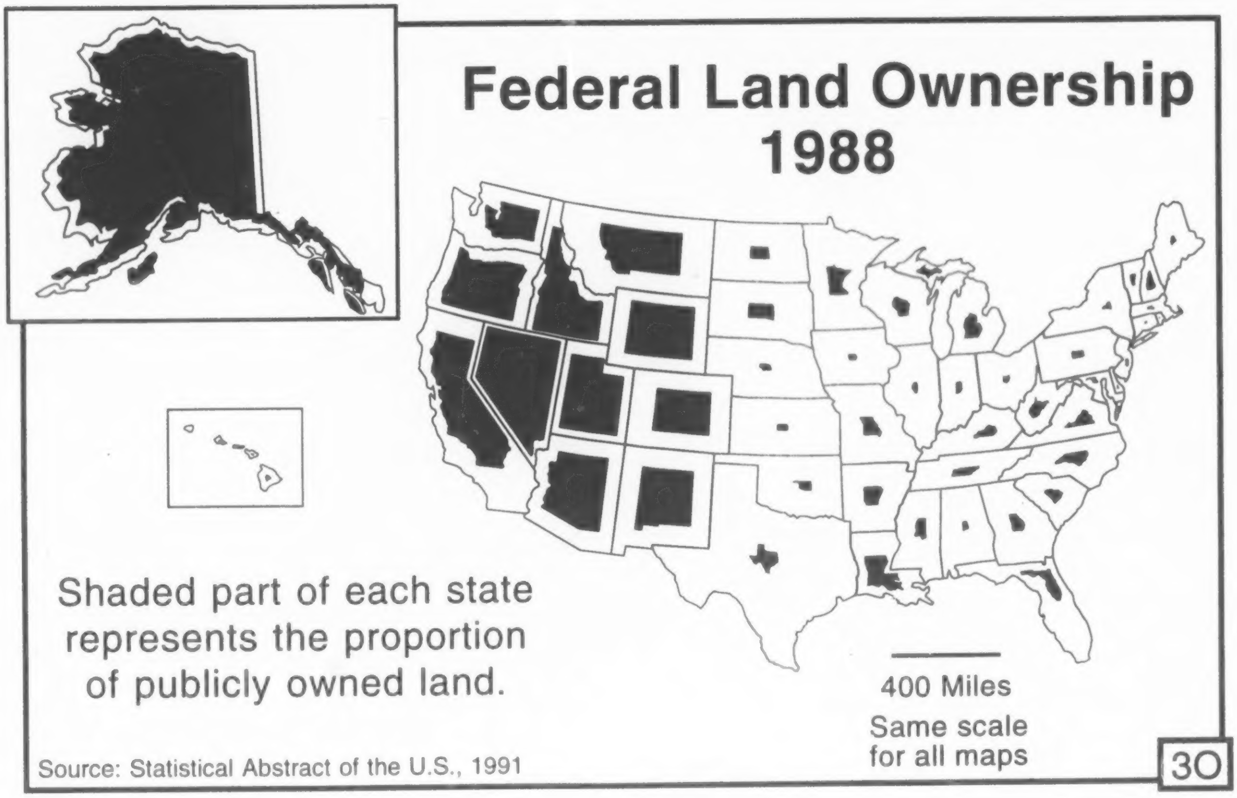
Compare maps to see how many things influenced the Civil War.

Activity: Project the transparency, and ask why those states chose to secede [they were the ones that had a plantation economy and slavery].

- add Transparency 4W to reinforce the conclusion; then add transparency 3K and discuss the role of growing season (see the teacher's notes for that transparency)
- add Transparency 3I (moisture regions). How does this help explain why plantations were where they were? [before deep-well pumps were invented, cotton could not grow west of the moisture-deficit line in middle Texas].
- add Transparency 3M. How does this help explain why the Civil War began when it did? The Missouri Compromise of 1820 said that new states should enter the Union in pairs, one slave and one free, to maintain the balance of power. By the 1850s, however, the frontier reached the moisture-balance line. The next states were not likely to use slaves. Therefore, the balance of power would shift to the North. Southerners in 1860 must have thought: "it's now or never."

Some effects are still visible 130 years later.

And the consequences? The sources cited above have maps of poverty, voting, education, labor unions, and many other features that are affected by lingering consequences of the Civil War and Reconstruction.

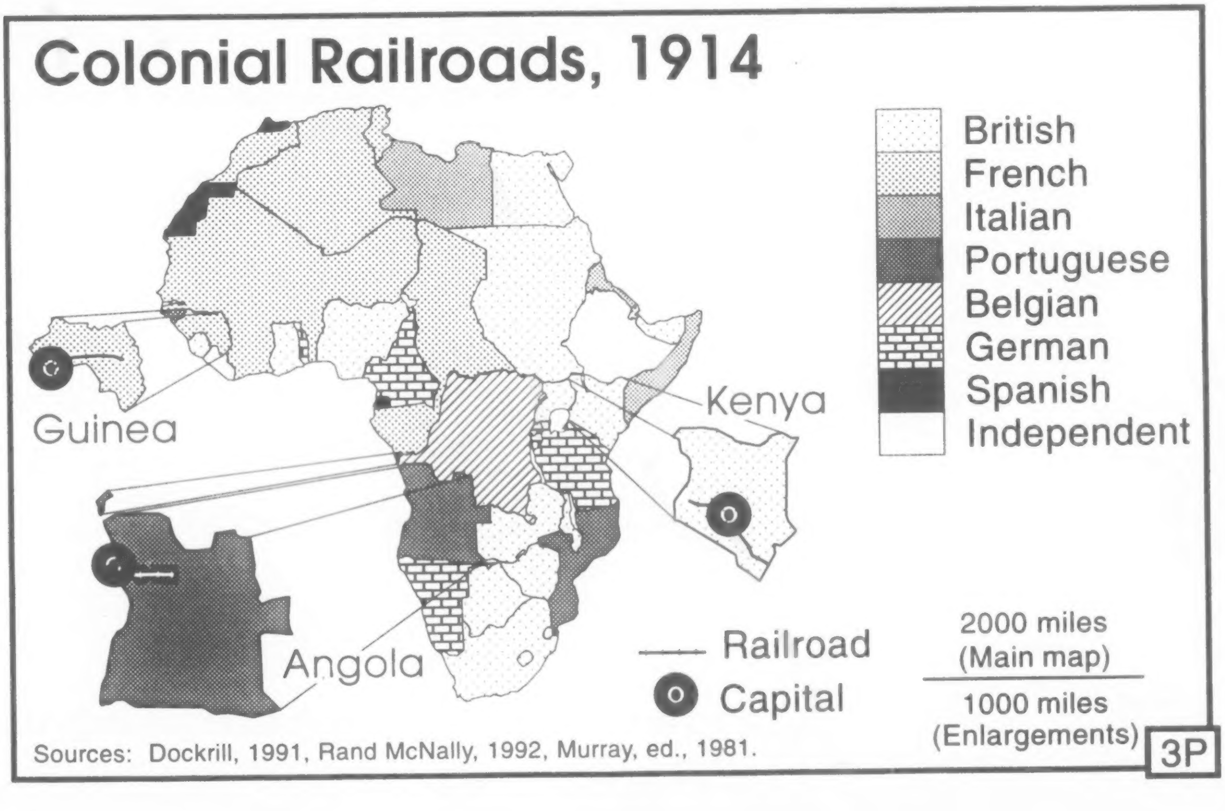


Federal Land Ownership 1988

Shaded part of each state represents the proportion of publicly owned land.

400 Miles
Same scale for all maps
3O

Source: Statistical Abstract of the U.S., 1991



Colonial Railroads, 1914

British
French
Italian
Portuguese
Belgian
German
Spanish
Independent
Guinea
Kenya
Angola
Railroad
Capital
2000 miles (Main map)
1000 miles (Enlargements)
3P

Sources: Dockrill, 1991, Rand McNally, 1992, Murray, ed., 1981.

TEACHER'S GUIDE FOR TRANSPARENCY 3O

The government "owns" more than half of the land in many states. People can use this land in many ways -- hiking, hunting, logging, grazing, even mining. They often pay nothing, or only a small fraction of what it would cost if the land were privately owned. That is one side of the government-ownership issue.

The government can change the rules of use almost overnight. That is a negative side of using public land for private purposes, and it exerts a huge cost, both economic and psychological.

Discuss investments a logger could make to be more efficient.

Activity: Say: "you are a logger, and you are trying to decide how to invest some of the money you earn by selling wood. You want to do things that could make your logging operation more profitable in the future. What are some things you should think about doing? [buy a new saw, buy a new truck, train some workers, plant some baby trees, start a research station to find a cure for a tree disease, etc.]

Do they make sense on land you don't own?

"Now that you've made a list of things you might do, let's ask a really messy question. How many of those things make sense if you don't know if you'll be allowed to cut trees in the forest next year?"

As if two sides of the public ownership issue weren't enough, here are some other sides: what other uses might the forest serve if it wasn't used for logging? Is it fair to private landowners to subsidize logging on public land? This is a regional issue: some loggers in the Southeast rightly complain that the government treats them unfairly when it makes deals with loggers in the West or North. All this is a good topic for an extended role-playing simulation, with students doing research on various regions and then arguing about proper use (see Table 3-4).

TEACHER'S GUIDE FOR TRANSPARENCY 3P

If you think public ownership is a knotty issue, try to unravel the effects of prior colonialism. Some people blame European colonialism for every ill that affects Africa today. Others call it a past issue with little effect on today. The truth, of course, is somewhere in between, and part of the solution to today's problems lies in finding out what present features in a place are legacies of past colonialism.

The railroad patterns of many African countries, for example, are left over from colonial times. Railroads are expensive to build and even harder to move. Once built, however, they affect what people can do and where they can do it. Bluntly, it is hard to sell a product if you cannot get it to customers.

The road and railroad patterns in an area, therefore, can limit options for economic and community development. In Africa, especially, railroads built in the colonial era served very different purposes than might be desirable today.

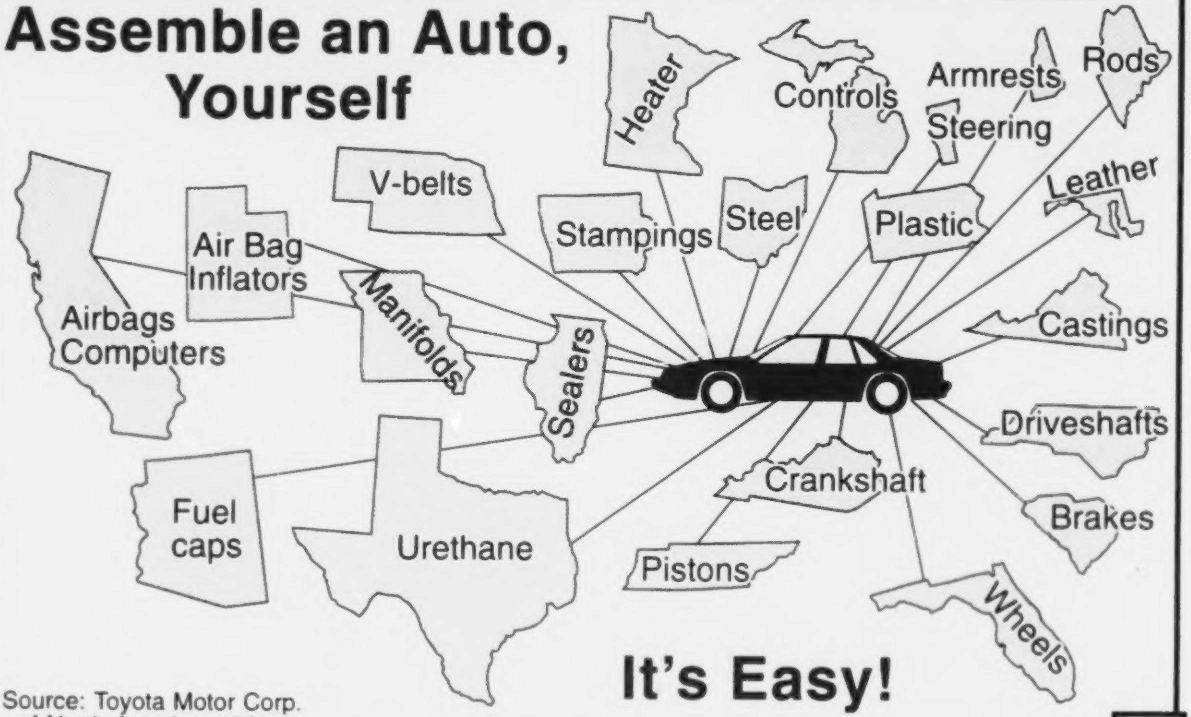
Discuss whether this road pattern makes more sense for colonial times or for today.

Activity: trace the pattern of major roads or railroads in an area. Then ask whether the road pattern seems to be better for:

- getting products to the coast (important for a colonial power)
- getting people to the capital (better for a modern government).

Other purposes include bringing raw materials to factories, moving people into new areas for settlement, or allowing exploration for oil or minerals. This transparency provides context for addressing those questions.

Assemble an Auto, Yourself

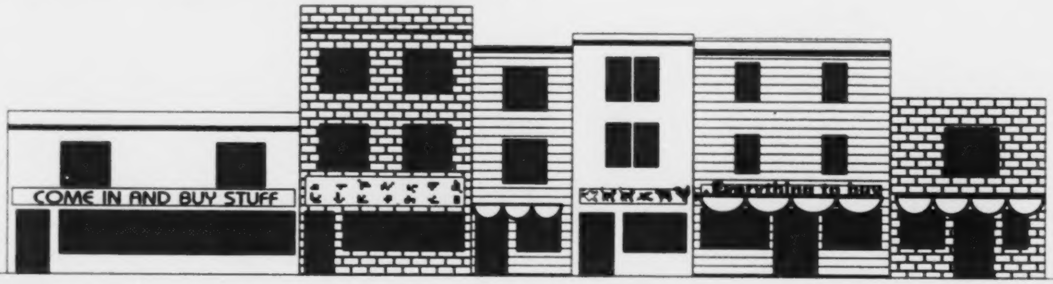

Heater
Controls
Armrests
Rods
Steering
V-belts
Air Bag Inflators
Stampings
Steel
Plastic
Leather
Airbags Computers
Manifolds
Sealers
Castings
Driveshafts
Crankshaft
Fuel caps
Urethane
Pistons
Brakes
Wheels

It's Easy!

Source: Toyota Motor Corp. of North America, 1994

3Q

Mapping storefronts


COME IN AND BUY STUFF
Everything to buy

Floors:	2	3	3			
Material:	Stucco	Brick	Wood			
Sign:	Yes	Yes	No			
Other:						

3R

TEACHER'S GUIDE FOR TRANSPARENCY 3Q

Industrial geography used to be fairly simple -- find a resource and make something with it. For example, Shoshone people in Wyoming made arrowheads and tools from obsidian, a rare rock that occurs there. Algonquian people made tools and jewelry from the copper they found in what is now Upper Michigan. European people made cloth in water-powered mills. Many of those mills were in New England, because that region had the ingredients for waterfalls -- a moisture surplus and rugged terrain.

Now, products and industrial processes are more complex. Factories often make only part of a product. Factors such as skilled labor, venture capital, tax concessions, school systems, even cultural amenities such as orchestras or art museums play a role in deciding where factories are located. This makes the academic-geographic question ("why is that factory located there?") harder to answer. It also adds complexity to the applied-geography question ("where is the best place to put that kind of factory?") Finally, it pushes an abstract-geography question ("are factories in this country being put in appropriate locations?") into the limelight of talk shows and congressional hearings.

Discuss what a factory owner might look for in a community.

How does our community stack up?

Activity: Ask students to list what owners might consider in deciding where to locate a factory. Don't settle for a safe "textbook" list: raw materials, markets, etc. Include features such as crime, local politics, sewer charges, parks, air pollution, anything else students think may be important. Then have students rate their own community (or another place of interest) by those criteria. Some well-designed maps or graphs could show how a community compares with other places.

TEACHER'S GUIDE FOR TRANSPARENCY 3R

Map making is an exercise in gathering data systematically and using standard symbols to depict the result. One way to practice this skill is to make a detailed survey of a small area in a community. This Transparency can help prepare students. Have them fill in the blanks for the number of floors, presence of signs, and construction materials. The example comes from an old Pennsylvania mining town, but things may not always be so clear. For example, how do you classify an old brick building with a new metal facade? Have students describe some buildings that they pass on the way to school, and then discuss how they might handle ambiguous categories in their final survey.

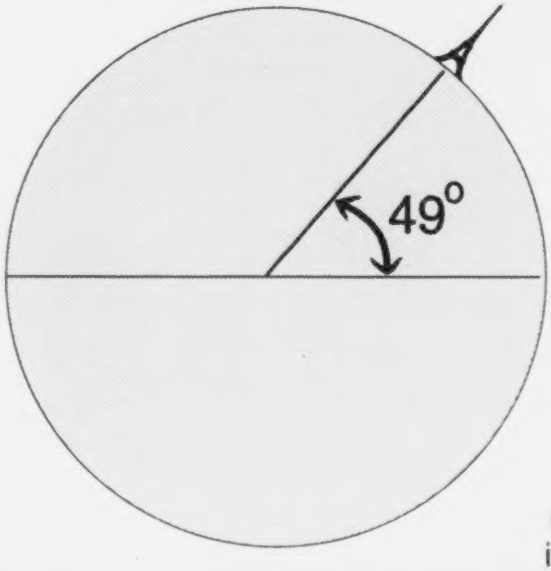
Make a map of a few city blocks.

Activity: Ask students to walk a block and record what they see. For example, one entry might read: "52 feet north from corner, three-story brick building, sign says built in 1897, first floor used as hardware store, two mailboxes in a stairway imply that people live on the second floor, broken window on third floor suggests it is empty."

The next step is to impose some order on the mass of information. This is usually done by taking one variable at a time, choosing reasonable categories, and recording the information.

This is not an exercise in divining what an authority would record. There is no "right" answer. The goal is to record useful information in a systematic way and then to communicate it clearly. Planning the survey in class can get students thinking about categories. In short, mapping a block lets students wrestle with issues of observation and classification.

Latitude - what is it?



It is the angle
north or south
of the Equator

Paris, France,
has a latitude
of 49 degrees;
it is that many
degrees north
of the Equator

(What important border
is at the same latitude?)

4A

Describing location

There are
many ways to say
***where** something is*

Landmark - *next to the water tower*

Topological - *midway between bank and library*

Distance/Direction - *three miles east of Lily*

Address - *at 1910 Maple Street*

Global grid - *at 34°S and 151°E*

Map grid - *in map sector 3B*

4B

TEACHER'S GUIDE FOR TRANSPARENCY 4A

The concept of latitude is straightforward, but any topic can be confusing when a pre-made transparency already has all the elements. "Where do we start?" is a common question with maps and other geographic diagrams. In one sense, this is not surprising, because geography is the science of what's happening in different places at the same time.

Activity: use washable markers to trace key features in a logical sequence:

Trace key lines and locations as you explain the concept of latitude.

- Suppose we want to find the latitude of Paris [highlight the Eiffel Tower].
- What is the definition of latitude? [the angle (technically, the "angular distance") of a place away from the Equator.]
- Here is the Equator. [highlight the horizontal line]
- Here's the line up to Paris. [highlight the diagonal line]
- And here is the angle we want. [highlight the curving two-headed arrow]
- optional: We could measure it with a compass. [put a plastic compass on the diagram and show how to measure the angle]

Look at a globe (or atlas); what important border is at the same latitude? [The long border between the United States and Canada, Minnesota to Washington. Optional: What does that tell us about Paris? It has about the same amount of daylight in winter as North Dakota. Most Americans do not realize that most of Europe is north of the latitude of New York City or Chicago.]

Now, where should I draw a diagonal line to show the latitude of Rio de Janeiro? It's at 23 degrees South latitude. Tell me when to stop. [slide the point of the marker down from the Equator along the outside of the earth until students tell you to stop; repeat with other cities until students can do it without much thought.]

TEACHER'S GUIDE FOR TRANSPARENCY 4B

People have invented dozens of "languages" to describe the locations of things.

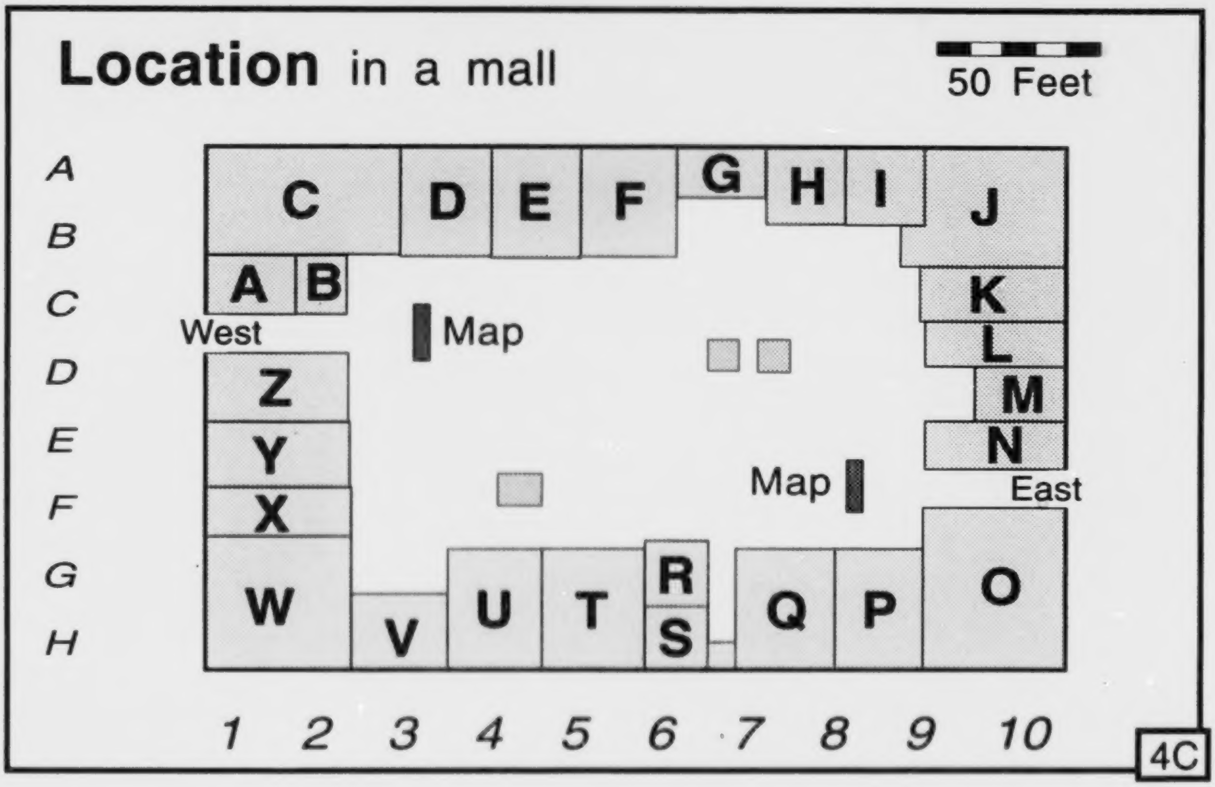
Discuss different ways to describe a location.

Activity: Use a 4x6 card to cover the sample descriptions on the right. Then, go down the list of terms; explain what each term means and ask students to suggest examples. Uncover the examples on the Transparency when appropriate.

An alternative is to cover the list and reveal each line as discussion proceeds.

A third way is to use the transparency as a summary of a free-form discussion. Start by asking students how many different ways they can think of to describe the location of the school (or some other well-known place). Write their suggested terms on the board as the discussion proceeds; you might even try to arrange them in the general order of the transparency, which goes in a rough logical sequence from concrete (landmark) to abstract (latitude and map grid).

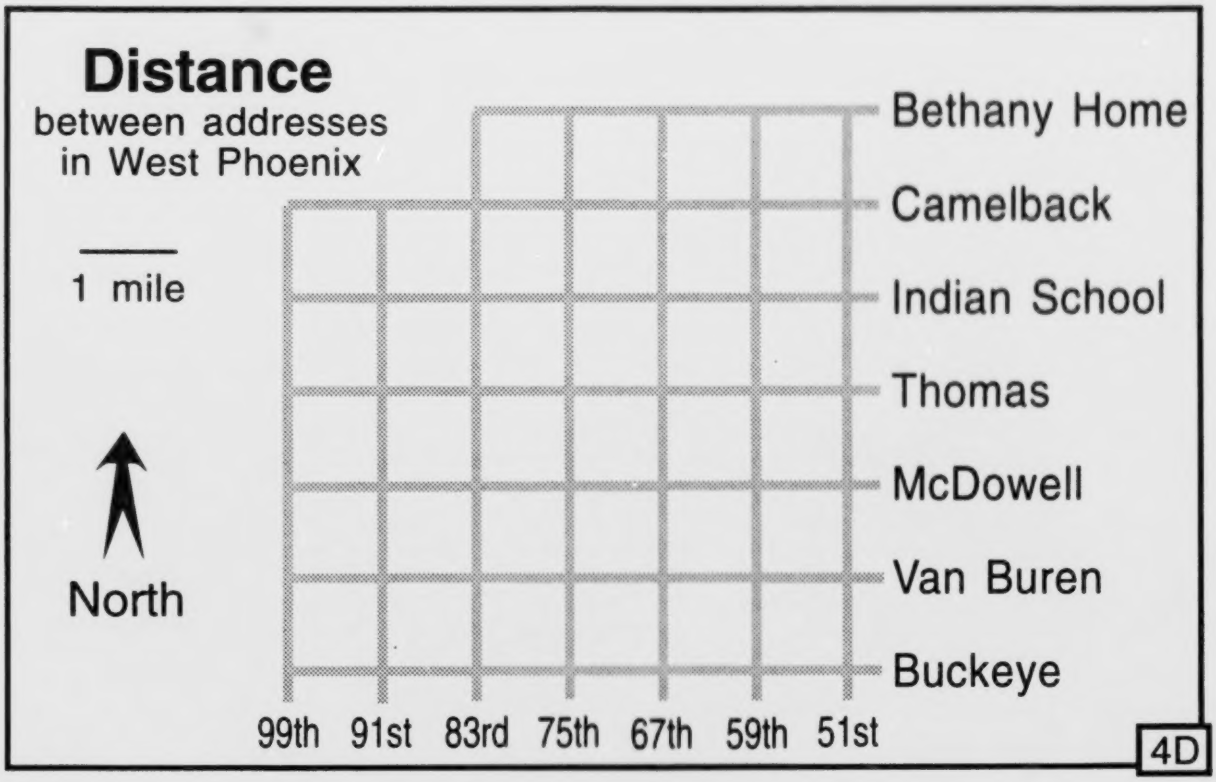
Discussion of this transparency can also serve as background for the activity on Transparency 4C.



Location in a mall

50 Feet
A
B
C
D
E
F
G
H
C
D
E
F
G
H
I
J
A
B
K
L
M
N
West
Map
Z
Y
X
Map
East
W
V
U
T
R
S
Q
P
O
1
2
3
4
5
6
7
8
9
10

4C



Distance between addresses in West Phoenix

1 mile
North
Bethany Home
Camelback
Indian School
Thomas
McDowell
Van Buren
Buckeye
99th
91st
83rd
75th
67th
59th
51st

4D

TEACHER'S GUIDE FOR TRANSPARENCY 4C

The concept of location is so important that people have invented many ways of communicating it to others. This Transparency shows a typical shopping mall (maybe point out some features, like the entrances, maps, and information kiosks). In this mall, someone could describe the location of store U as:

- between stores T and V
- directly across from stores D and E
- the sixth store to the right from the west entrance
- 100 feet west of the east map and then south
- at map coordinates H4

These examples of location-descriptions use landmarks, topology, relative distance, absolute distance, or map coordinates to specify location (see transparency 4B).

"Encode" and "decode" messages about locations in a mall.

Activity: Have each student write down the location of a store and pass it to the student to the left. That student, in turn, "decodes the message," figures out what store is being described, writes its location in another "language," covers the first message, and passes it on. Continue like the game "telephone" and then see if they are still describing the same store (or if the locational message got confused along the way).

Then repeat the activity with a map for a shopping center, stadium, golf course, or some other place of interest in the local area.

TEACHER'S GUIDE FOR TRANSPARENCY 4D

The ability to measure distance and translate map measurements into real-world terms is important for many purposes.

Activity: write down a list of addresses and times on the board:

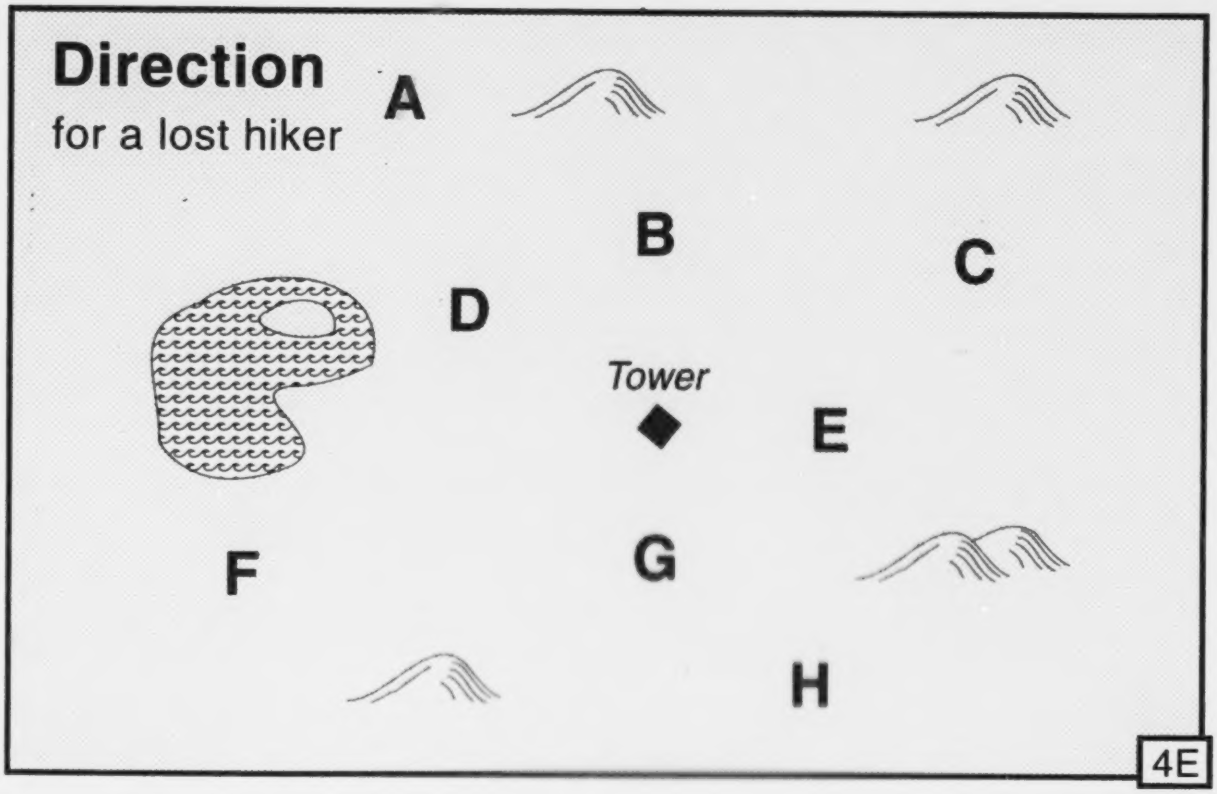
Measure distances to see if one person could have committed all of these crimes.

Camelback and 67th	9:15	9:20
McDowell and 59th	9:34	9:45
Van Buren and 91st	9:50	10:01
Indian School and 75th	10:17	10:25
Buckeye and 83rd	10:31	10:38

The first time is when a clerk said a robber entered a store. The second time is when the robber cut the phone cord and left.

If a robber is trying not to attract attention by driving too fast, it would take two minutes to go one mile. The question is -- could one robber have committed all of the crimes? (In police-novel jargon, are these robberies the work of a serial criminal or a copycat?)

To answer this question, students have to figure out the shortest route, count blocks, translate the blocks into time, and compare with the time elapsed between reported robberies. This Transparency is for demonstration only. The flat land of West Phoenix has an exceptionally simple street pattern, and the problem is more difficult (and more interesting) in a place with some diagonal roads, one-way streets, curving roads, parks, or other complications in the traffic pattern. Repeat the activity with a map of the local area or other area of interest.

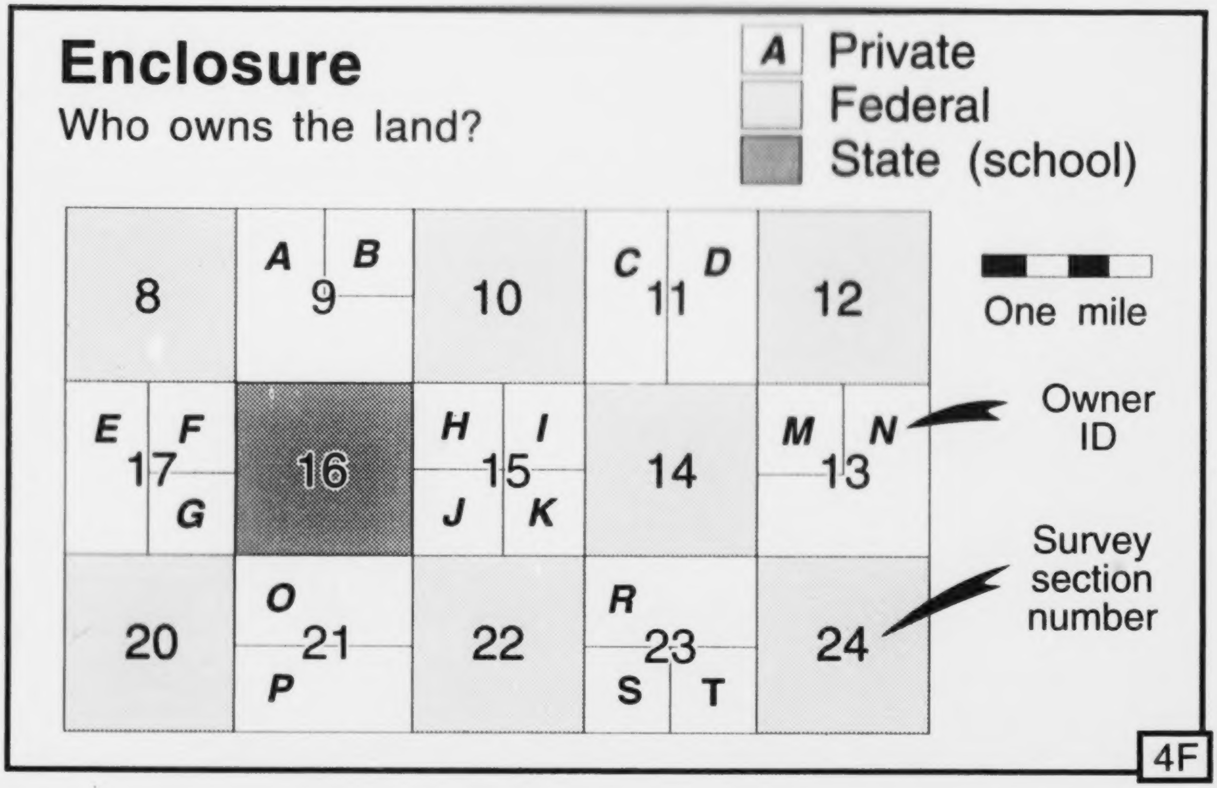


Direction

for a lost hiker

A
B
C
D
Tower
E
F
G
H

4E



Enclosure

Who owns the land?

A Private
Federal
State (school)
8
A
B
9
10
C
D
11
12
One mile
E
F
17
G
16
H
I
15
J
K
14
M
N
13
Owner ID
O
21
P
20
22
R
23
S
T
24
Survey section number

4F

TEACHER'S GUIDE FOR TRANSPARENCY 4E

The third basic spatial concept is the idea of direction. This map shows a small area in the glacial hills of southern Wisconsin.

Activity: ask students to imagine that they are hikers who can see some landmarks in various directions. Then ask:

Try to find your location if you know the directions to some visible landmarks.

- Where are you if there is a tall tower directly south of you? [Use non-permanent marker to draw lines southward from several of the lettered places; place B is the only one with a tower directly to the south.]
- Where are you if there is a single hill to the north and a double one to the south? [Using two clues helps reduce the chance of error.]
- Where are you if there is a tower to the west and a double hill to the southeast? [Intermediate directional names may be needed to communicate the location of a place.]
- Where are you if you see a lake to the south-southwest and a hill to the east? [Intermediate directions can get confusing; that is why good hiking compasses also have numbers, to show degrees clockwise from north and thus to allow more precise reading.]

Once students master the basic idea with this simplified map, use a topographic map of a local area (or some other area of interest). To make the exercise more challenging, omit the letters and have students try to mark where they are or use coordinates to describe their location. In upper grades, you could introduce the complication of magnetic vs. true north. In short, like any fundamental skill, finding position by "direction backsighting" has several levels of difficulty and therefore can be treated at several grade levels.

TEACHER'S GUIDE FOR TRANSPARENCY 4F

This map uses the "language" of the United States Public Land Survey to describe specific tracts of land. This survey was used in most areas west of the Appalachian Mountains (except in French settlements in Louisiana and along the Mississippi River, where a longlot system is used, and in areas with Spanish land grants, such as in Texas, New Mexico, and California).

This particular map is from the northern Rocky Mountains. It shows the "checkerboard" pattern that is common where the government granted alternate sections of land to companies to build railroads. Hundreds of thousands of square miles of the American West have this kind of land ownership pattern.

Describe areas in terms of the Public Land Survey.

Activity: Tell students their cousins wrote to say that they had discovered gold in Section number 10; they asked you to study the map to see if that area is privately owned. [It is owned by the federal government and therefore may be available for lease.] Repeat the request for other areas, such as the southwest quarter of Section 15 [owned by J]; the NW 1/4 of Section 23 [owned by R]; and so forth.

Compare sizes of areas.

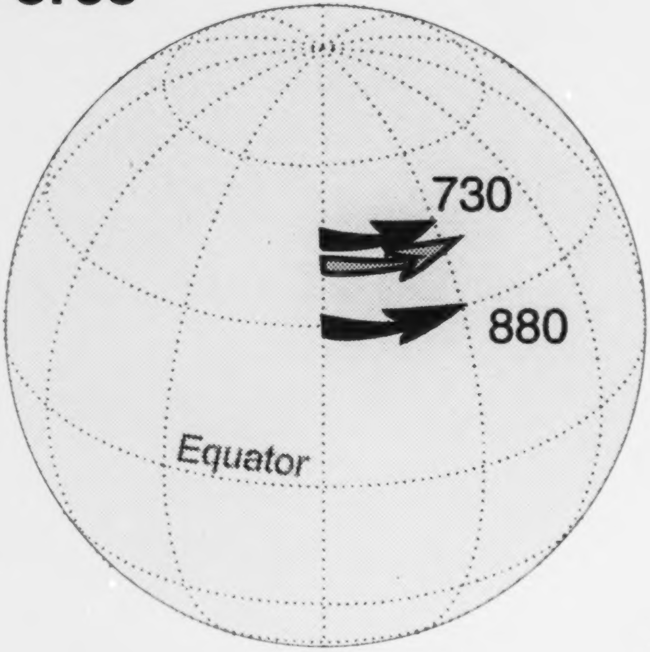
Activity: Ask students whether tract A is bigger or smaller than C. OK, that was easy -- now, which is bigger: a ranch that owns tracts A, F, and E and leases Section 8 from the government, or a ranch that owns tracts O, P, R, and S and has a lease on section 22?

The Coriolis "Force"

As the earth rotates, things at 30^{o}N latitude are moving almost 900 miles per hour toward the east.

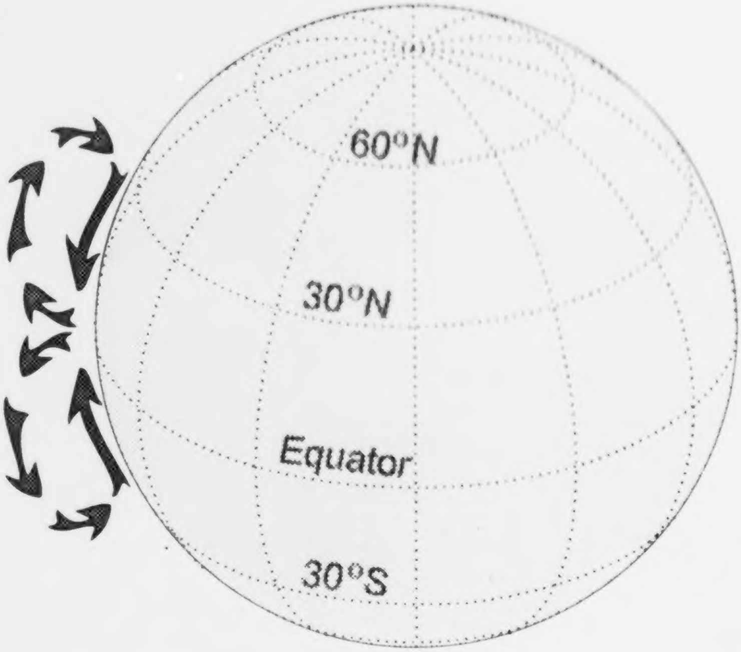
Things at 45^{o}N are moving barely 700 miles per hour.

A wind that blows north will race "ahead" of the ground below; to a person on the ground, the wind seems to turn toward the east.



4G

Subsidence



Air rises near the Equator

and goes down about 27 degrees (of latitude) north and south of where it rose.

4H

BEST COPY AVAILABLE

TEACHER'S GUIDE FOR TRANSPARENCY 4G

The Coriolis "Force" is a pervasive, important, and hard-to-teach "fact" about the earth. Part of the problem is that some texts are full of nonsense about it (such as "notice how water swirls when you unplug a sink?" That vivid image, alas, is fluid dynamics, not a Coriolis effect). The Coriolis effect operates on a scale of tens to thousands of miles, and it deflects any object in motion. The deflection is to the right of the direction of movement in the northern hemisphere and to the left in the southern; this is why hurricanes always spin in a predictable direction.

Activity: use washable markers to highlight and draw arrows as you go through a logical sequence of steps such as the following:

Trace the movements of air above a rotating globe.

The earth is spinning from west to east [sweep the pen from left to right across the diagram, but don't draw anything yet]

As a result, every place on earth is in motion. Here, at 30 degrees north latitude, the speed of the surface is about 880 miles per hour to the east [trace the arrow from left to right]

Here, at 45 degrees N, it is going only 730 mph [trace the arrow]

Air at 30 degrees is moving nearly 900 miles an hour [point]. If this air moves north, it is like merging into a slow lane on a highway. The air is going faster than the ground below [trace from the tip of the 30-degree arrow to the tip of the hollow arrow at 45 degrees; start going north along the meridian and then make an exaggerated rightward curve, so that you end at the tip of the 45-degree arrow; a curving path is more accurate and also more evocative than a straight line]

To an observer on the ground, the wind seems to veer off to the right, toward the east [repeat the curve]

That is why we in the U. S. look to the west to see what weather is coming [continue the movement eastward at 45 degrees N]

The same thing happens at the equator; air is going nearly a thousand miles an hour there [draw a new arrow to the east]

As it rises and then moves north, this air also curves to the east [draw a curve that starts at the equator and is heading east by the time it gets to 30 degrees latitude]

These eastward flows are the *jet streams*, and they help make the weather that people feel below [shift to Transparency 4H]

TEACHER'S GUIDE FOR TRANSPARENCY 4H

Trace arrows as you explain the movement of air.

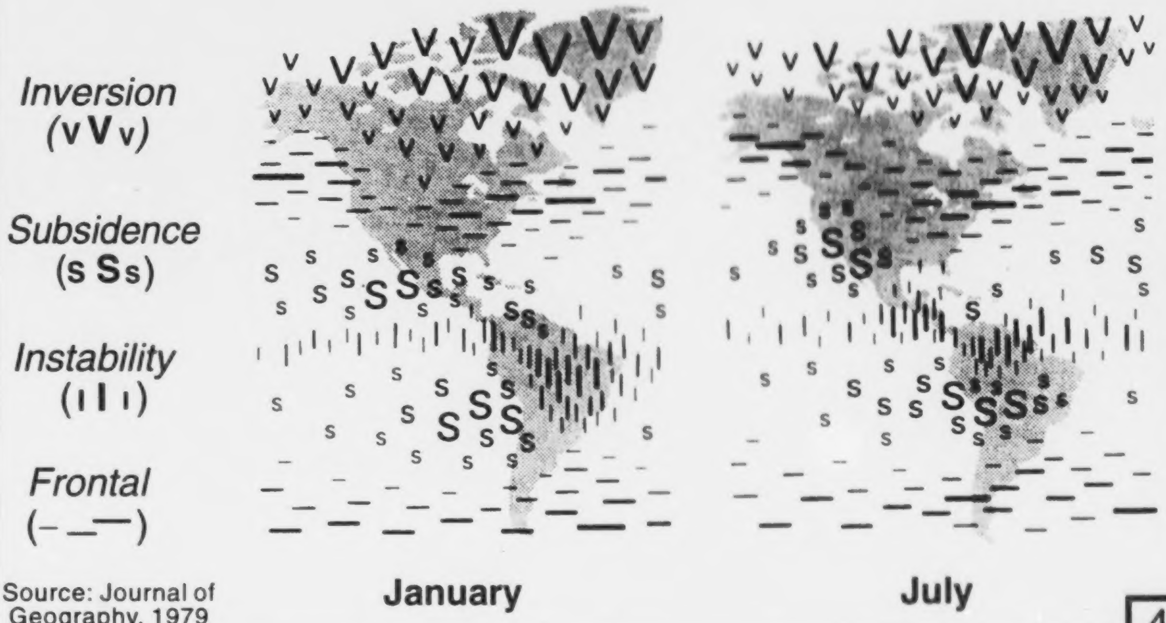
Trace and explain: Heat from the sun makes air rise at the Equator. This makes thunder and rain [trace the upward arrow above the equator].

Then the air moves north and south [trace the northward arrow high above the surface].

As it goes, the air is turned to the east by the Coriolis Effect (the inevitable result of motion on a spinning earth). That in turn causes crowding, which pushes air down toward the surface [trace the downward flow].

Downward flow makes deserts here, about 25 to 30 degrees of latitude north (and south) [draw clockwise ellipses over the arrows in the Northern Hemisphere to show the cycle; then shift to Transparency 4I]

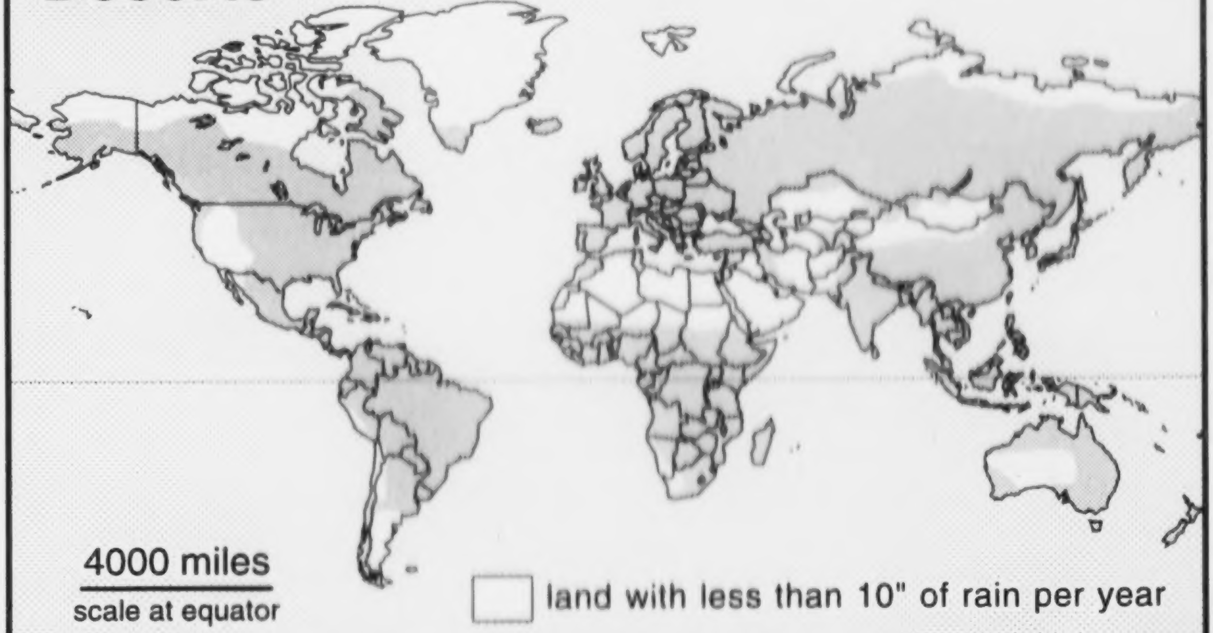
Western Climate Types


Inversion
(vVv)
Subsidence
(sSs)
Instability
(ıIı)
Frontal
(–_—)
January
July

Source: Journal of Geography, 1979

4I

Deserts


4000 miles
scale at equator
☐ land with less than 10" of rain per year

Sources: Goode's World Atlas, Hammond Comparative World Atlas; projection by Voxland.

4J

TEACHER'S GUIDE FOR TRANSPARENCY 4I

You could start with Transparencies 4G and 4H to explain reasons for the process shown on this map. Or, you could just begin by asserting that surplus solar energy near the Equator sets in motion a long chain of events that have consequences all over the world. Either way, one especially important result of Equatorial heating is a persistent downward movement of air about 25 to 30 degrees north and south latitude (the actual position depends on a number of factors, including season, ocean currents, and arrangement of mountains).

Point to places and ask what climate they have in the other season.

Activity: point to a specific place, such as southern California. Note that it is in rainy Frontal climate in January; ask what it has in July.

The purpose of this kind of map is to save people from having to understand all of the factors that cause a particular result. The map shows us the places in the world where downward movement of air occurs. This lets us trace consequences without necessarily knowing the causes. That, in a nutshell, is one of the great strengths of maps, but only insofar as people realize one important thing: a map is a communication device, not a fact. A map is a summary of what we understand about the world, not a record of what is really there.

This is a tricky balance. It is why we recommend tracing "backwards" through some maps to look at underlying assumptions and theories. The influence of the Subsidence is so great (and the pattern so worth knowing) that Transparency 4I is a good map to use for backwards-tracing -- hence Transparencies 4G and 4H.

Merely knowing about sinking air, however, is no big deal. The process shown on Transparency 4I gets its importance primarily through its results; Transparency 4J shows the global pattern of one of those consequences.

TEACHER'S GUIDE FOR TRANSPARENCY 4J

Rain occurs when moist air rises. (Technically, condensation occurs when air cools; air cools when it expands; and air expands when it rises.)

Activity: let's make a list of ways nature can make air rise. [The sun can heat it until it rises all by itself. Wind can push it up a mountainside. It can collide with colder air.]

List places where forces cause air to rise or sink:

what are the consequences of those air movements?

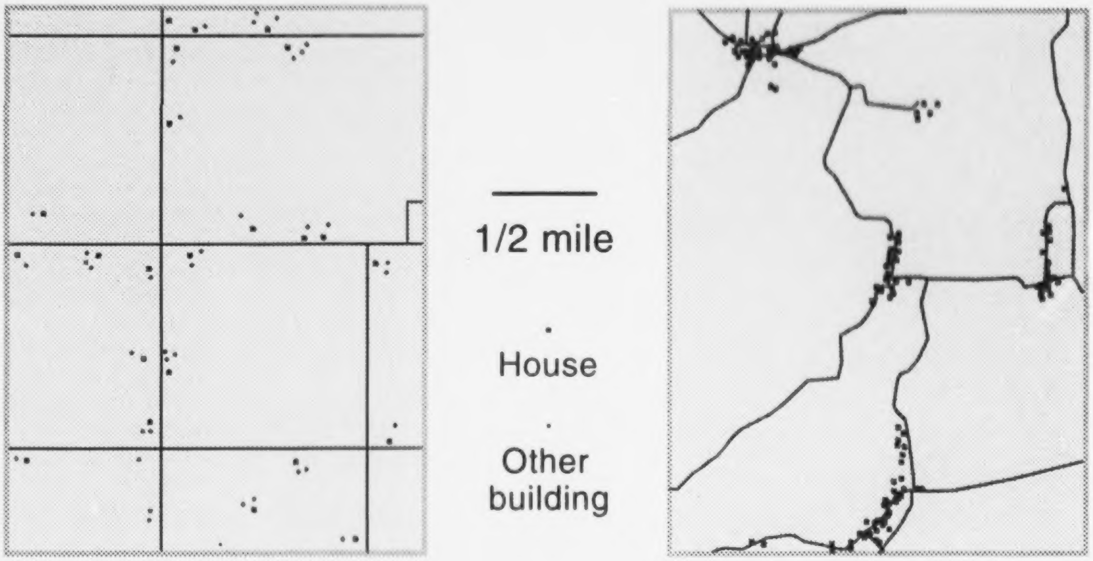
Where does this happen? [heating in Brazil, or in Alabama on a summer afternoon. wind in Oregon, Norway, or north India. cold air where the weather map says a front is coming.]

Now make a list of ways nature could keep rain from happening. [Have the air be dry. Have the air stay still or move downward.]

Here is a map of land areas that get less than 10 inches of rain. Compare it with the map of downward moving air (4I). How many of the world's deserts are "explained" by Subsidence? [Sahara, Arabian, Mojave, Atacama, Kalahari, Great Australian -- all the deserts between 25 and 30 degrees latitude. This can be a dramatic moment, with a teacher pointing at a map with exaggerated gestures: "this one? Yeah!")

What explains the other dry areas? Well, where are they? [mostly way up north]. So why are they dry? [Third grade: the air is too cold to rain. Junior high: cold air cannot hold much moisture.]

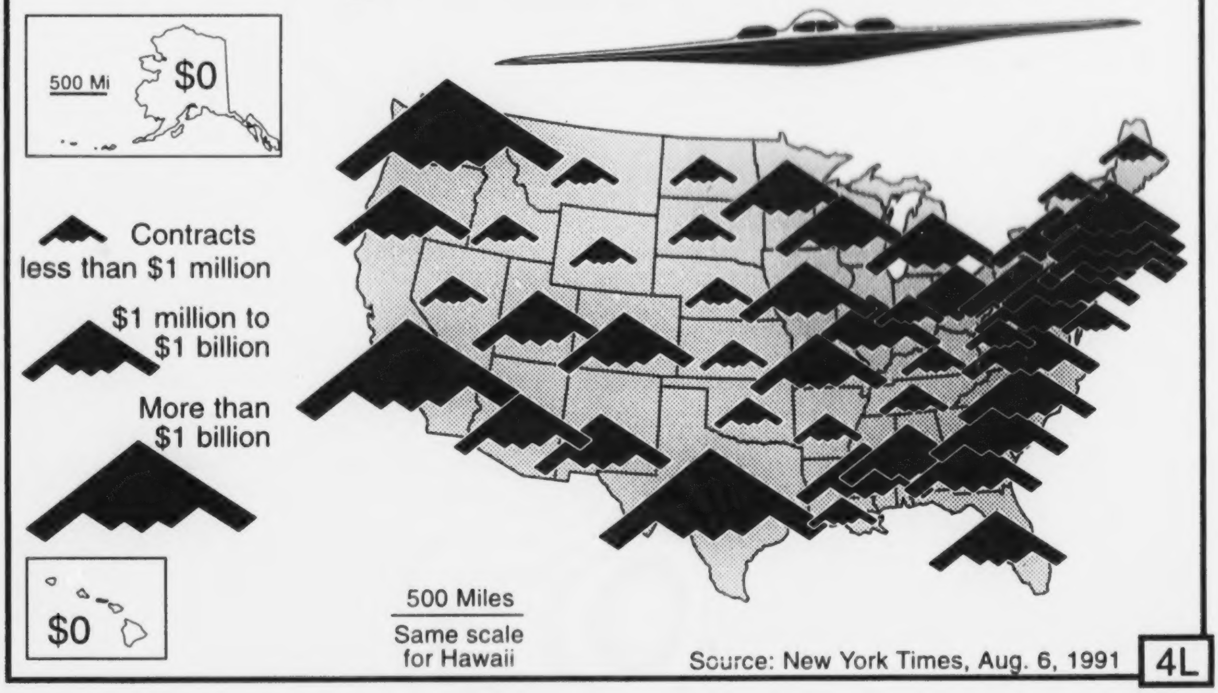
Settlement in Iowa and Germany


1/2 mile
House
Other building

Sources: Iowa - U.S.G.S. topographic quadrangle, Hawkeye, IA, 1981
German - Bayer. Topogr. Bureau, Topographische Karte, Waal, 1958.

4K

Who's *not* got a share in the B2 Bomber?


500 Mi
$0
Contracts less than $1 million
$1 million to $1 billion
More than $1 billion
$0
500 Miles
Same scale for Hawaii

Source: New York Times, Aug. 6, 1991

4L

TEACHER'S GUIDE FOR TRANSPARENCY 4K

Architects have a saying: "We mold space into buildings, and then our buildings help mold us." Geographers extend this idea to the entire landscape. The first people in an area have quite a bit of freedom to put property lines, fences, roads, buildings, and other things wherever they want. Once those features are in place, however, they have a powerful influence on what people can do in the future.

This is especially true in the case of buildings. They are large and hard to move, and therefore they influence where other things are built around them. People in different places have different ways of arranging houses and other buildings.

Match maps of settlements with places on a map.

Activity: find pictures of different arrangements of houses -- examples might include an Iowa farmstead, some East-Coast city rowhouses, a group of adobe houses in Arizona, a cluster of concrete high-rise apartments in Moscow, a Bavarian chalet, a village of stilt houses in the Amazon rainforest, a Tibetan monastery, etc. Post the pictures and a map with letters showing where the pictures were taken. Have students try to match houses with their locations (like Transparencies 3C and 3D, but with an emphasis on the arrangement of houses as well as their individual style).

Measure the distance an ambulance or mail carrier has to travel to serve people in an area.

Activity: pass out maps of different arrangements of houses and have students measure the distance a mail carrier has to travel in order to deliver mail to 20 houses. What about emergency ambulance service: what is the average distance from the hospital to a typical house? Alternate between the concrete skill of measuring and the abstract idea that people choose how to arrange houses (and that all arrangements have tradeoffs -- for example, cheap mail service might require people to live closer together than they would like).

This activity has a strong citizenship component, because the arrangement of houses has implications about social relations, energy use, and other costs. One cannot deal with those issues without examining the influence of the geographic arrangement of key features in our "built environment."

TEACHER'S GUIDE FOR TRANSPARENCY 4L

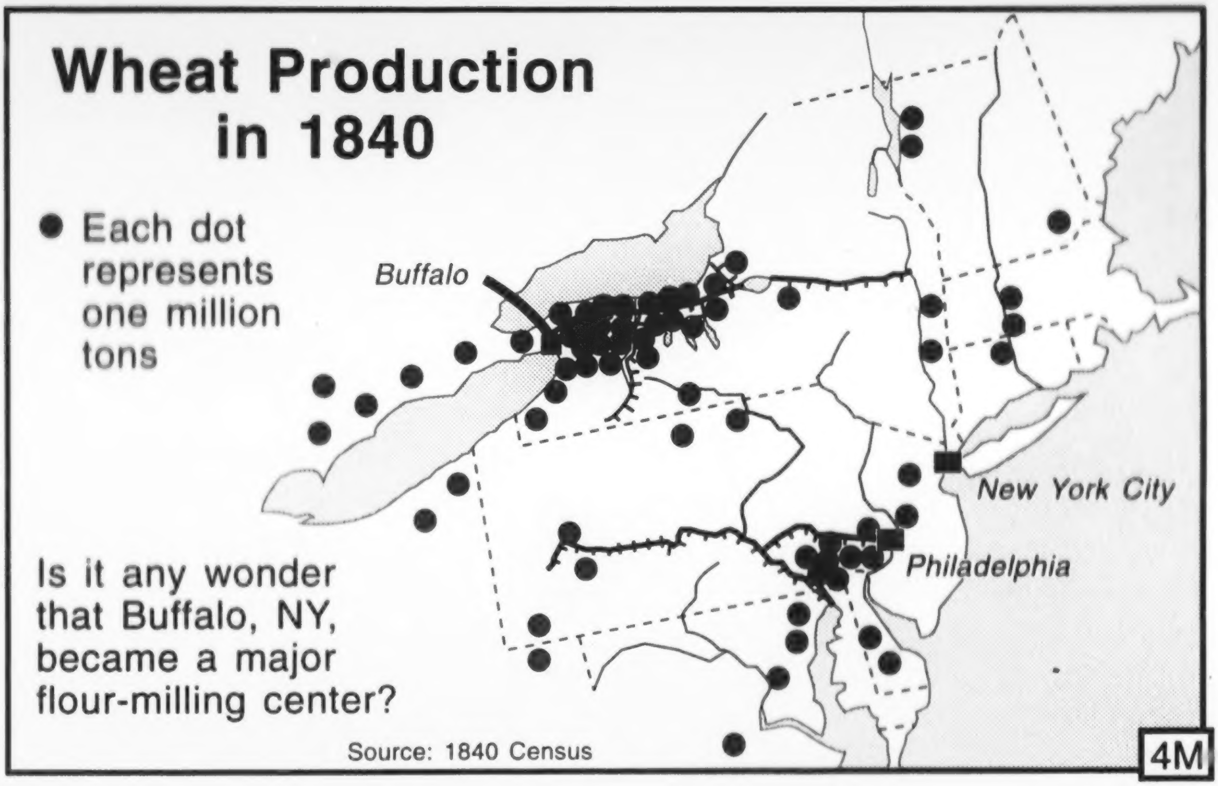
The sources of material for a complex product is another aspect of the same basic question about where to put things. There are tradeoffs. Having all of the parts factories close together may lower the cost of transporting parts. On the other hand, some parts might require specialized raw materials or skills that are available only in specific places. Moreover, putting factories in many states makes it harder for Congress to reduce military spending, because closing down a weapons factory has an impact on jobs in many areas around the country.

Try to find out why parts are made in certain places.

Activity: examine the map and try to figure out what airplane parts might be made at specific locations because of some important local feature. For example, aluminum frames might be built in the Pacific Northwest because aluminum refining uses a lot of energy, and electricity from big river dams is cheap and plentiful there.

(How do we know that? It is the scissors principle in action: a puzzling map about airplane parts makes it seem worthwhile to search an almanac, atlas, or computer data set for information about local places. Why don't we provide all of "the answers?" Because this is supposed to be a short book about teaching geography, not a big fact book about geography!)

Wheat Production in 1840

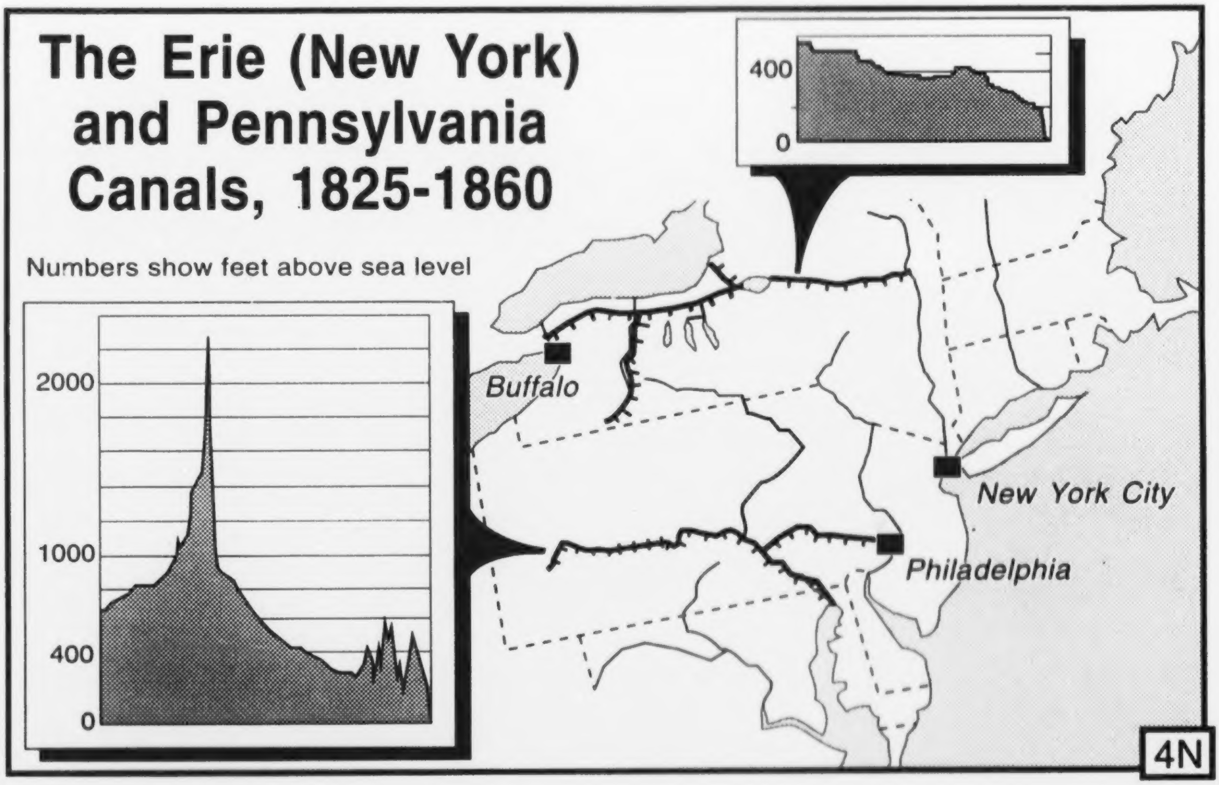

● Each dot represents one million tons
Buffalo
New York City
Philadelphia

Is it any wonder that Buffalo, NY, became a major flour-milling center?

Source: 1840 Census

4M

The Erie (New York) and Pennsylvania Canals, 1825-1860


Numbers show feet above sea level
400
0
2000
1000
400
0
Buffalo
New York City
Philadelphia

4N

TEACHER'S GUIDE FOR TRANSPARENCY 4M

Subsistence farmers (those who grow their own food) usually raise a variety of crops so that they have a balanced diet. Wheat is a commercial crop: people grow it to sell to others, in order to get money to buy things they want.

What makes a product heavy?

Activity: ask students if they would describe wheat as heavy, like coal; or light, like diamonds or computers (this is a slightly tricky question, because the right unit of measurement is not the weight of an individual grain of wheat or a diamond ring; it is the weight of comparable values of different products. For example, a hundred dollars worth of wheat weighs half a ton, whereas an equivalent value of computer chips weighs only a few grams). So, wheat is heavy.

To sell a heavy, perishable product such as wheat, people need either:
- a location close to the customers
- a good transportation system to get the product to the customers
- a factory that can transform the product into something lighter and less perishable [does that help explain why the legislature in North Dakota voted to subsidize a pasta factory?]

How does Buffalo, New York, illustrate several of these principles? [Encourage speculation, then show Transparency 4N].

TEACHER'S GUIDE FOR TRANSPARENCY 4N

This transparency will be easier to read if you use a permanent marker before class to (lightly) color New York and Pennsylvania and their profile lines.

To change elevation, canal boats have to be lifted by locks or cable railroads. For that reason, the 2,200-foot Allegheny Mountain was a major barrier in the path of the Pennsylvania Canal. The story of competition between New York and Pennsylvania is in the text; it is a justly famous illustration of three important geographic principles:

1) the role of *infrastructure* in economic growth (in this case, a canal made products easier to ship -- see transparency 4M),

2) the interaction of topography and human activity (which makes the Pennsylvania canal much more expensive than the Erie Canal through New York), and

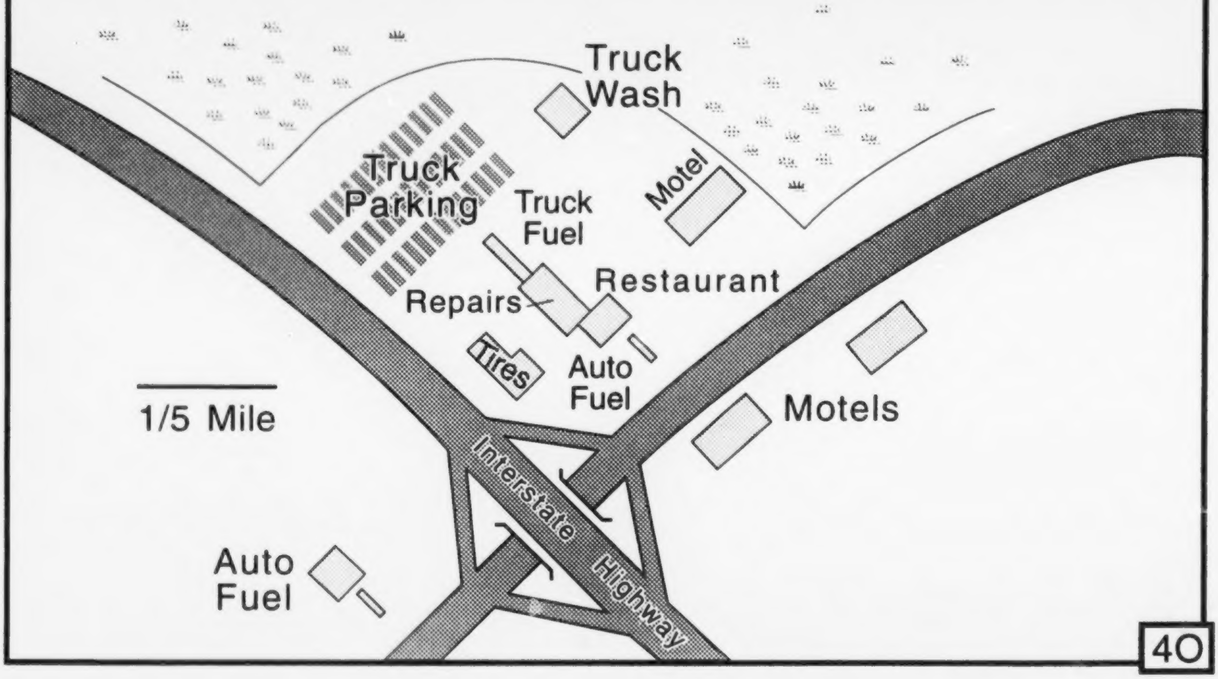
3) the "noble stupidity" of someone with good intentions putting something like a canal in an inappropriate environment.

Examine the side profiles of two canals and list some implications.

Activity: ask students to imagine life before automobiles or trucks. Canal boats were the cheapest way to move heavy things on level ground. A canal lock could raise or lower a canal boat about ten or fifteen feet in half an hour. Then ask students to look at the profiles and estimate:
- elevation change on each canal [2200 feet in PA, 450 in NY]
- number of locks it would take [5 times as many in PA?], and
- extra time needed to cross Pennsylvania [days, weeks?]

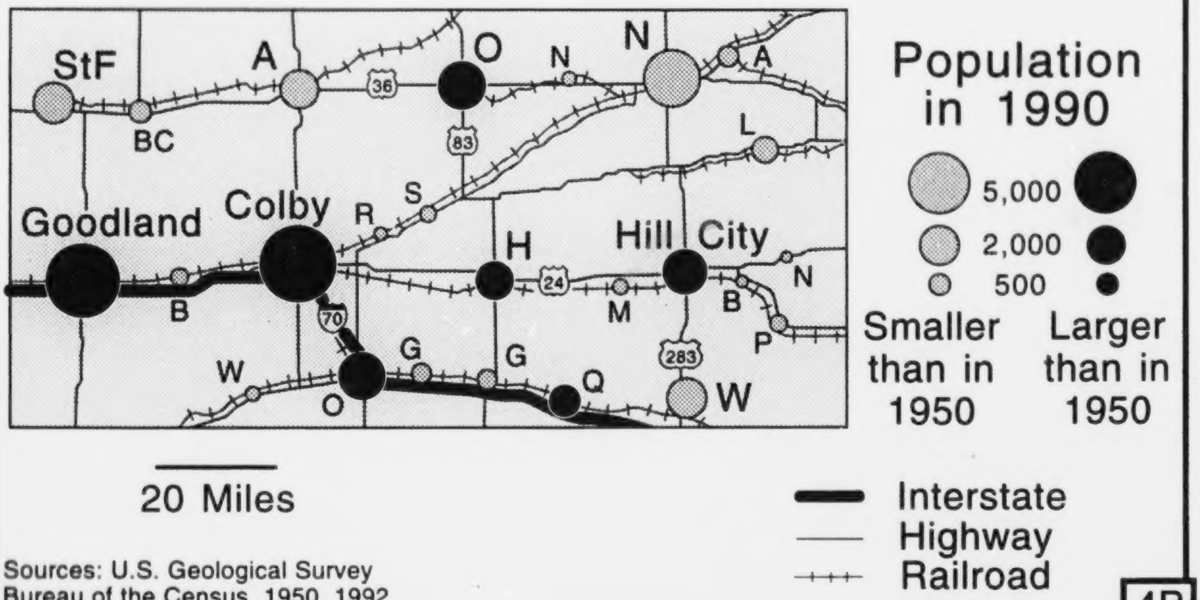
Ask if they would rather have a farm in western Pennsylvania or western New York, if they want to sell wheat to people in eastern cities or Europe. Then show Transparency 4M again. Kicker: why is the Stock Exchange in New York City? Originally, to trade wheat! How does its location affect the pattern of wealth today? Per-capita income in Manhattan is nearly twice the national average.

Freeway Exit near Savannah, GA


Truck Wash
Truck Parking
Truck Fuel
Motel
Restaurant
Repairs
Tires
Auto Fuel
Motels
1/5 Mile
Interstate Highway
Auto Fuel

4O

NW Kansas Population, 1950-1990


StF
A
O
N
N
A
BC
36
83
L
S
R
Goodland
Colby
H
Hill City
N
B
24
M
B
P
70
G
G
W
O
Q
283
W
Population in 1990
5,000
2,000
500
Smaller than in 1950
Larger than in 1950
20 Miles
Interstate
Highway
Railroad

Sources: U.S. Geological Survey
Bureau of the Census, 1950, 1992

4P

BEST COPY AVAILABLE

TEACHER'S GUIDE FOR TRANSPARENCY 4O

Each era has some unique, newly-available resources that lead to explosive growth of distinctive landscape features:

- in the late Middle Ages, when ecclesiastical authority was still strong and building technology was improving, practically every major city of Europe built an impressive Gothic cathedral;
- in the 1400s and 1500s, when sailing ships became trustworthy, powerful port cities emerged in most good natural harbors;
- in the Industrial Revolution of the 1700s and 1800s, textile mills and towns were built near waterfalls that could be used for power;
- in the 1800s and early 1900s, railroads and autos allowed people to live in "dormitory suburbs" outside of the cities where they work
- in the late 1900s, limited-access highways were built between major cities, land around highway exits became a resource, and clusters of service buildings appeared near most exits.

Make individual sketch maps, compare them, and then draw conclusions.

Activity: Ask each student to make a sketch map of the area around an Interstate Highway exit. The goal is to locate motels, gas stations, tire-repair stores, souvenir shops, and other features with sufficient accuracy that the class can compare maps and make generalizations (e.g., what percentage of exits have feature X? what is the average distance from the highway to these features?)

Variant: Make maps from aerial photographs rather than in the field. Photos may be available from county highway departments, planning offices, or the ASCS (look under U.S. Government, Dept. of Agriculture in the phone book).

TEACHER'S GUIDE FOR TRANSPARENCY 4P

Hill City, Kansas, illustrates the other side of the new-resource coin. This town used to have a great location on a major railroad and highway from Kansas City through Colby and Goodland to Colorado. Then the Interstate came. I-70 parallels highway 24 through eastern Colorado, enters Kansas, passes close to Goodland and Colby, and then turns southeast before it gets to Hill City.

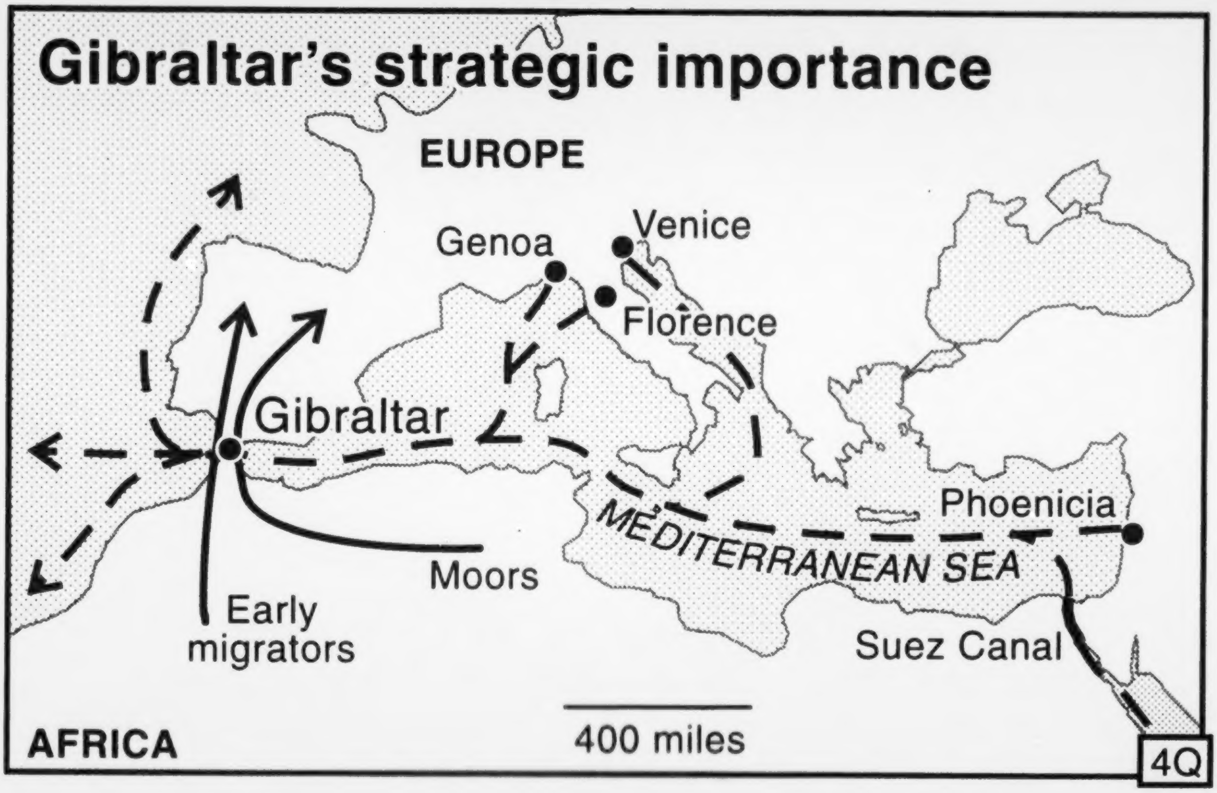
The impact was almost immediate. Hill City became a much less desirable location for factories, warehouses, truck-repair shops, restaurants, hotels, and a host of other functions. The result is clearly visible on a map of population in recent years. Goodland and Colby continue to grow steadily, while Hill City and many other towns have grown only slowly or actually lost population.

The picture is complicated by the movement of services at a local scale. Some towns got so small that they could no longer support a school, grocery store, doctor, etc. The remaining people drive to nearby towns where the services are still available. As a result, one town might gain customers and grow even as towns around it lose population. The school in Morland (M) closed in 1994; its students now go to Hill City. Other "decliner" towns include Bogue, Palco, and Nicodemus (an "exoduster" town, settled by ex-slaves after the Civil War).

Draw population maps for other places.

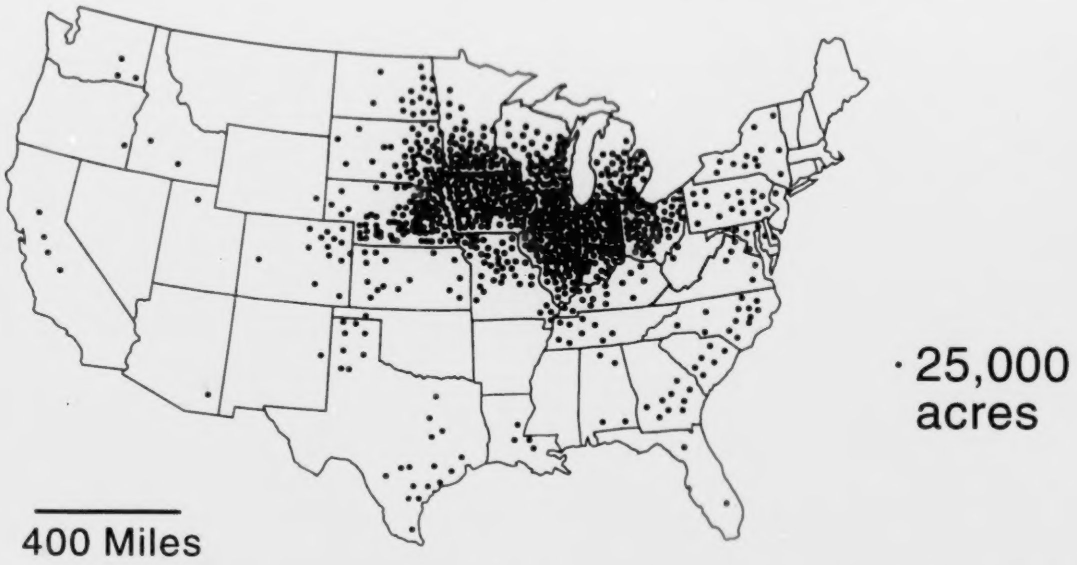
Activity: have students use census data to make maps for other areas of interest (and try to explain the pattern). Maps like these have practical value: decisions about store and office locations need this information.

Gibraltar's strategic importance


EUROPE
Genoa
Venice
Florence
Gibraltar
Phoenicia
MEDITERRANEAN SEA
Moors
Early migrators
Suez Canal
AFRICA
400 miles

4Q

Corn Production


· 25,000 acres
400 Miles

Source: 1992 Census of Agriculture

4R

TEACHER'S GUIDE FOR TRANSPARENCY 4Q

For several thousand years, Gibraltar was of great strategic importance. What's interesting is that its importance seemed to change with each major shift in transportation technology:

- for early people, the narrow Strait was a way to get from Africa to Europe;
- for the ancient Phoenicians, the Strait of Gibraltar was a way for their sailing ships to venture out of the Mediterranean Sea and reach the coasts of Europe and North Africa;
- for the Moors, the Strait was a bridge for their armies to invade Europe and help bring about the end of the Roman Empire;
- for explorers from Florence, Genoa, and Venice, the Strait was the gateway to the Atlantic and the riches that lay across the ocean;
- for the British, Gibraltar was a potential tollgate for their tankers carrying oil from the Middle East through the new Suez Canal;
- and now, in an age of ballistic missiles, Internets, and supertankers that are too big to fit through Suez, Gibraltar has practically no strategic significance (like the Erie Canal in Transparency 4N?)

Look at a map and try to find transportation "choke-points."

(Hint: Harpers Ferry is one; see 1C and 1D)

Activity: look at a world map, and try to identify other "choke-points:" places where an army or navy can control movement between two large bodies of water or masses of land. The strategic significance of a choke-point depends on what resources and populations are on each side. Once you have identified some possibilities, have students gather information from an almanac, encyclopedia, or computer data set. The goal is to see how important the choke-point was at a particular time.

TEACHER'S GUIDE FOR TRANSPARENCY 4R

The Corn Belt is a classic *formal* region; it is a sizeable area where people responded to similar environmental conditions in similar ways and created a landscape that is more or less *homogeneous*.

Compare maps to see what factors might limit the extent of the Corn Belt.

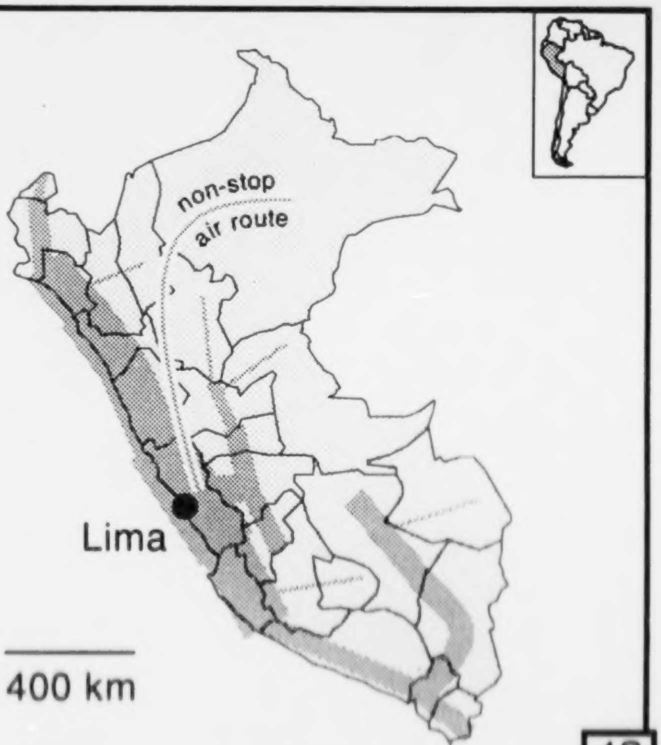
Activity: ask students what environmental conditions might be important in limiting the extent of the Corn Belt. Discussion (aided by map overlay) should uncover at least three significant environmental factors:

- growing season. Most corn needs at least 90 days to mature. Add a few weeks to allow for climatic variability, and look for at least 4 frost-free months (compare Transparency 3J)
- moisture. Most corn needs a slight moisture surplus during the growing season (compare Transparency 3I)
- good land. To use a machinery and to minimize soil erosion, a corn farmer needs fairly flat land with fertile soil. The glaciers that came from Canada helped level the land and improve soil depth and quality (compare Transparency 3L)

Repeat for other crops in other places.

Activity: use map comparison to try to identify key environmental conditions that limit other important agricultural regions, such as the wheat-growing areas of Canada or Siberia, the rice lands of China, the grazing regions of Argentina or Australia, etc.

Traffic in Peru


non-stop
air route
Lima
400 km

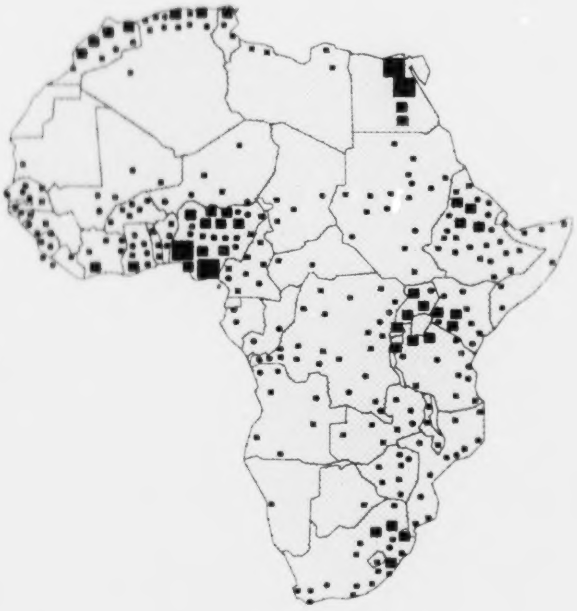
Passengers on major routes

- 200,000
- 1,000,000
- 3,000,000

Simplified from Atlas del Peru, 1989

4S

Population



Approximate number of people in late 1980s

- ■ 20,000,000
- ▪ 5,000,000
- · 1,250,000

Gersmehl and Rohde, 1994; data from Schwartzberg

4T

TEACHER'S GUIDE FOR TRANSPARENCY 4S

Peru is a country with a communication problem: the big cities are near the Pacific Coast, but many resources are on the east side of the country. In between are three great mountain ranges: the Cordillera Occidental (CORE-dee-yay-rah means mountain range, ox-ee-den-TAHL means western), Cordillera Central (cen-TRAHL), and Cordillera Oriental (Oh-ree-en-TAHL means eastern).

The influence of these mountains is apparent on this map of the functional region of Lima (LEE-mah, the largest city). The width of the lines indicates the traffic on major roads as they follow valleys between the mountain ranges.

Make regions based on road patterns.

Activity: find highway maps and have students trace big roads, so that they stand out from the clutter. Study the maps to see what might influence the road pattern. Arkansas, for example, has (at least) four distinct road regions:

- an eastern region of flat land and straight roads
- a southwestern region of hilly land and curving roads
- a west-central region of east-west ridges and valley roads
- a northwestern region of irregular high hills and twisty roads

These are *formal regions* (areas of "homogeneous" terrain and road patterns). The state also has a number of *functional regions* (areas that are linked by traffic flow). Try to figure out what people would be likely to shop in Fayetteville, Fort Smith, Texarkana, Little Rock, Blytheville, or Memphis. Take account of city size, distance, and the pattern of roads in dividing the state into the Little Rock shopping region, the Fayetteville one, and so forth (see also Transparency 9A).

TEACHER'S GUIDE FOR TRANSPARENCY 4T

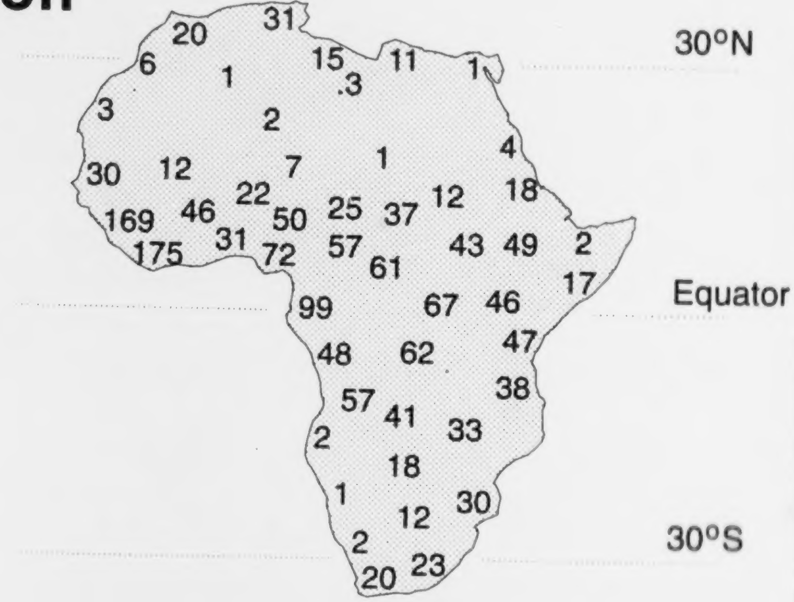
This population map shows that Africa has several separate clusters of people. The continent has about 700 million people, living on close to 12 million square miles of land. For perspective, both the population and the area are about three times the size of the United States. Unlike in the United States, however, many people in Africa still raise much of their own food, and therefore the patterns of soil fertility and rainfall are important for everyday life.

Compare maps of population and precipitation.

Activity: Ask students to compare this map with Transparency 4U and make generalizations about the relationship between rainfall and population density. [Like many questions about map patterns, this can have several levels of complexity. At a gross scale, students should note that the dry Sahara and Kalahari are almost uninhabited. At the same time, wet areas near the Equator have relatively few people. This is partly because rain tends to wash nutrients out of soil, leaving it less fertile and therefore less able to produce food for humans. Sparse population near the Equator is also related to the topic of Transparency 4V; many human and crop diseases thrive in hot and wet places.]

A logical extension of this Activity is to look at rates of population growth. The Population Reference Bureau publishes an annual chart of populations and growth rates for each country of the world. Like this map, that chart represents a best guess, because different countries make their censuses in different years. That is the reason for the vague heading over the legend on this map -- we simply do not know the exact population of every country at a single point in time.

Precipitation


20
31
6
1
15
.3
11
1
30°N
3
2
1
4
30
12
7
18
169
46
22
50
25
37
12
175
31
72
57
61
43
49
2
17
Equator
99
67
46
48
62
47
38
57
41
33
2
18
1
30
12
2
30°S
20
23

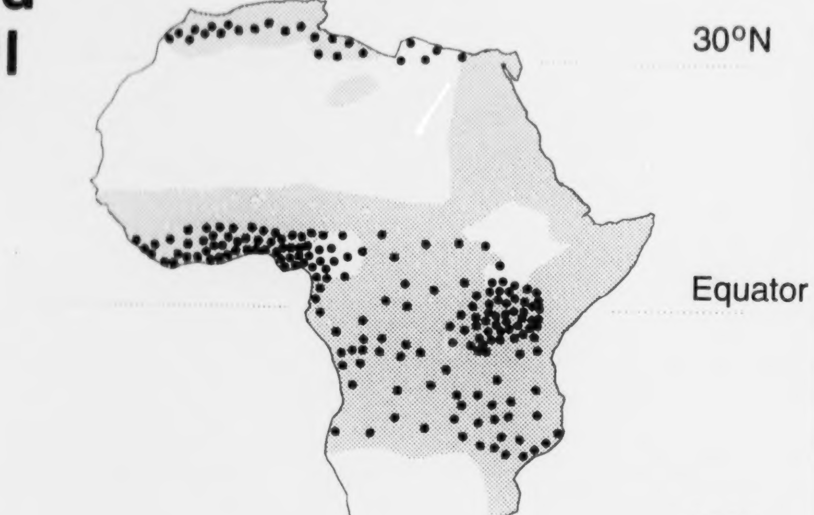
Numbers show annual precipitation in inches

(as measured at 50 major weather stations)

Gersmehl and Rohde, 1994; data from Climates of the World, 1969

4U

Malaria and Sickle-Cell Anemia


30°N
Equator
30°S

▨ Historical malarial areas

⁘ Historical sickle-cell areas

Friedman & Trager, Scientific American, March 1981

4V

BEST COPY AVAILABLE

TEACHER'S GUIDE FOR TRANSPARENCY 4U

This map is only half finished, as far as the purposes of the text are concerned. The numbers are accurate for each location, but the overall pattern is difficult to discern easily. The *isoline* (a specific map "language") was invented to handle this problem -- it translates a mass of numbers into a visually coherent pattern (but only if a pattern exists in the original data!)

Identify places with high and low values, and

Activity: To teach students how to draw isolines, it sometimes helps to make a quick regional map out of the data. Make copies of the map for each student (or pair or small group). Ask students to put a box around the number at each place that gets more than five feet (60 inches) of rain in a year. Then have them circle the number at each place that gets less than 12 inches. The result is a crude regional map that identifies several wet and dry regions.

draw isolines to separate them.

The next step is to draw isolines. An isoline is a separator -- it separates places with more than its value from places with less than its value. Demonstrate by tracing on the Transparency with an erasable marker: "a 12-inch isoline would enter Africa between the 3 and the 30 on the west coast, go directly through the 12, and continue east between the 7 and the 22, through the next 12, and between the 4 and the 18 near the Red Sea. Another (shorter) one enters from the east between the 2 and the 18, curves around this 2, and exits between it and the 17."

Have students put two more 12-inch isolines in the appropriate places on the map. Then, have them draw 60-inch lines to separate the boxed places from the places with less rainfall.

Then color the 60-inch-plus areas with a dark color, the 12-to-60-inch areas with a medium color, and leave the less-than-12-inch areas unshaded. The result should be a map much like the inset on Transparency 2I.

The resulting isoline map is easy to compare with Transparencies 4T and 4V.

TEACHER'S GUIDE FOR TRANSPARENCY 4V

Compare with 4T and 4U.

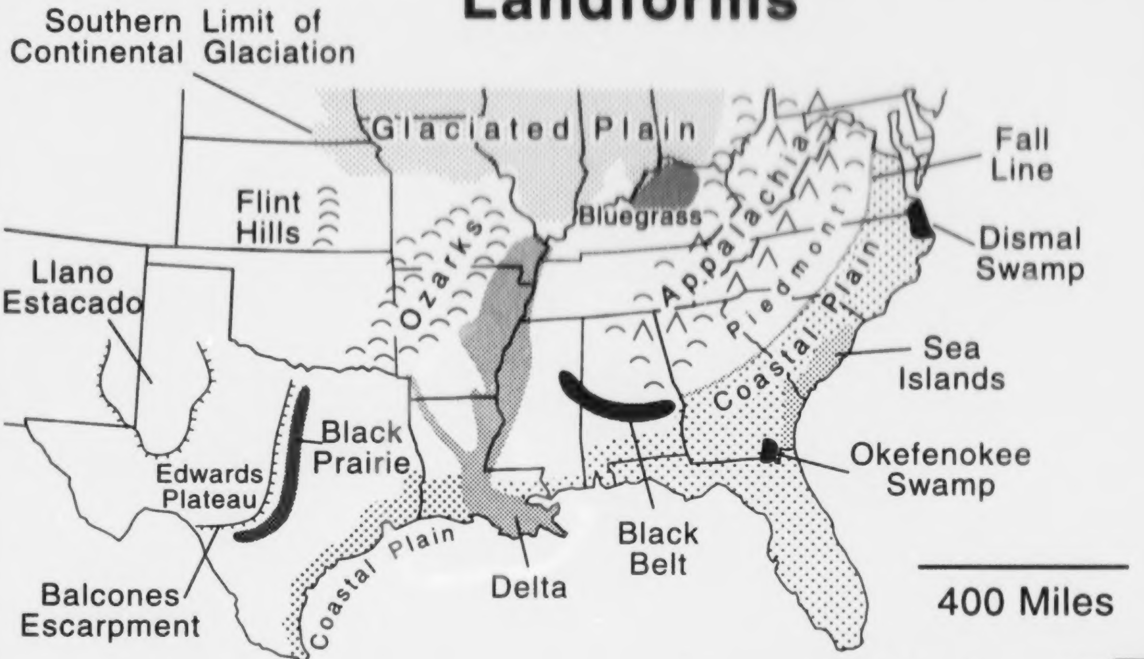
As the text says, malaria is carried by mosquitos. How might a comparison of maps 4U and 4V help medical researchers identify the cause of the disease? [Mosquitos need water; they thrive in places with a lot of rain or melting snow, especially if the terrain allows swamps to form].

Sickle-cell anemia is a genetic disorder. People get sick if they get the sickle-cell gene from both parents. People who get the gene from only one parent have few symptoms, but they are "carriers" who can pass the disease to their children.

Ordinarily, this kind of disease would slowly disappear from a population, but the sickle-cell trait has an important side-effect. A carrier of the gene is partially immune to malaria. This gives people with the sickle-cell gene an advantage in tropical regions, and they are likely to increase in number even though many of their children may suffer from sickle-cell disorder.

When these people move to another region, their "carrier status" is no longer an advantage. This background helps explain why sickle-cell anemia in America is a disease that affects mostly people who came from Africa. It therefore is a problem primarily in the rural South and some large urban areas of the North.

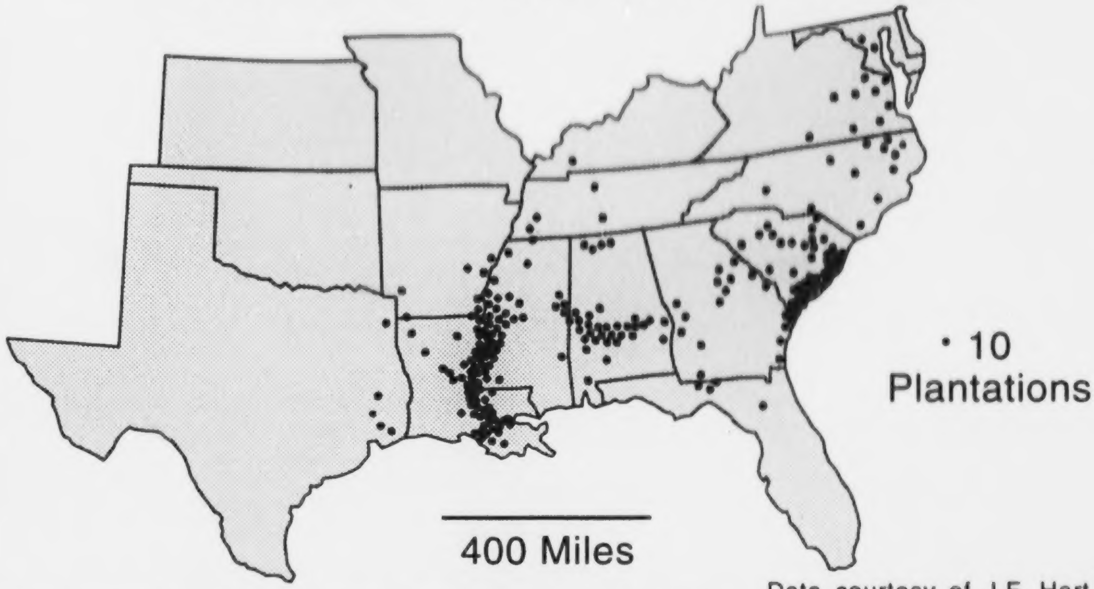
Landforms


Southern Limit of Continental Glaciation
Glaciated Plain
Fall Line
Flint Hills
Bluegrass
Dismal Swamp
Llano Estacado
Ozarks
Appalachia
Piedmont
Coastal Plain
Sea Islands
Black Prairie
Edwards Plateau
Okefenokee Swamp
Coastal Plain
Balcones Escarpment
Delta
Black Belt
400 Miles

Source: adapted from *Argus*, 1995

4W

Plantations With 100 or More Enslaved Persons in 1860


· 10 Plantations
400 Miles

Data courtesy of J.F. Hart.

4X

TEACHER'S GUIDE FOR TRANSPARENCY 4W

This simple dot map just screams one fact at the reader: the South was not a land of wall-to-wall giant plantations before the Civil War. The lifestyle depicted in *Gone With the Wind* was the exception, not the rule.

In fact, more than a third of the counties in the South voted against secession, because they had little economic or political stake in the institution of slavery. Many of them joined the fight only when armies were entering their territory and threatening their families. Some of them actually fought on the Union side.

Why is that important for us today? Because some economic and demographic consequences of the plantation and Reconstruction eras are still evident on maps of income, education, voting, and other variables. So, an understanding of where the big plantations were located can help us put a number of present-day issues into context.

Compare maps of plantations and landforms.

Activity: Compare with Transparency 4X. What landform regions were most likely to have large plantations? [the Low Country of South Carolina, the Black Belt of Alabama, and the Delta of Mississippi and Arkansas; see below]

TEACHER'S GUIDE FOR TRANSPARENCY 4X

Activity: Compare with Transparency 4W. What traits do the plantation regions have in common? Flat and fertile land. Much of the South, however, was red sandy or clayey soil on hills. People who tried to grow cotton on those relatively infertile soils were "rewarded" with low yields and severe erosion. Many "oldfields" were already abandoned by the time of the Civil War. Some were still used for cotton after the war, but by the mid-1900s most of the land was in pine trees or pasture.

Map comparison can be either visual or mathematical.

Activity: To compare maps in a more rigorous way, throw twenty grains of rice or small stones on this map. Note their locations, and then find exactly the same locations on Transparency 4W. The next step is to tabulate the results; count the grains in each landform region, and then count the percentage of those locations that had large plantations.

The reason for using stones or rice is to take the selection of sample points out of the control of the analyst. Another way to do that is to make a sampling grid: find (or make) some graph paper with lines about half an inch (or one centimeter) apart. Put the grid behind the map, and put dots on every major line intersection. Then put dots on the other map in exactly the same locations.

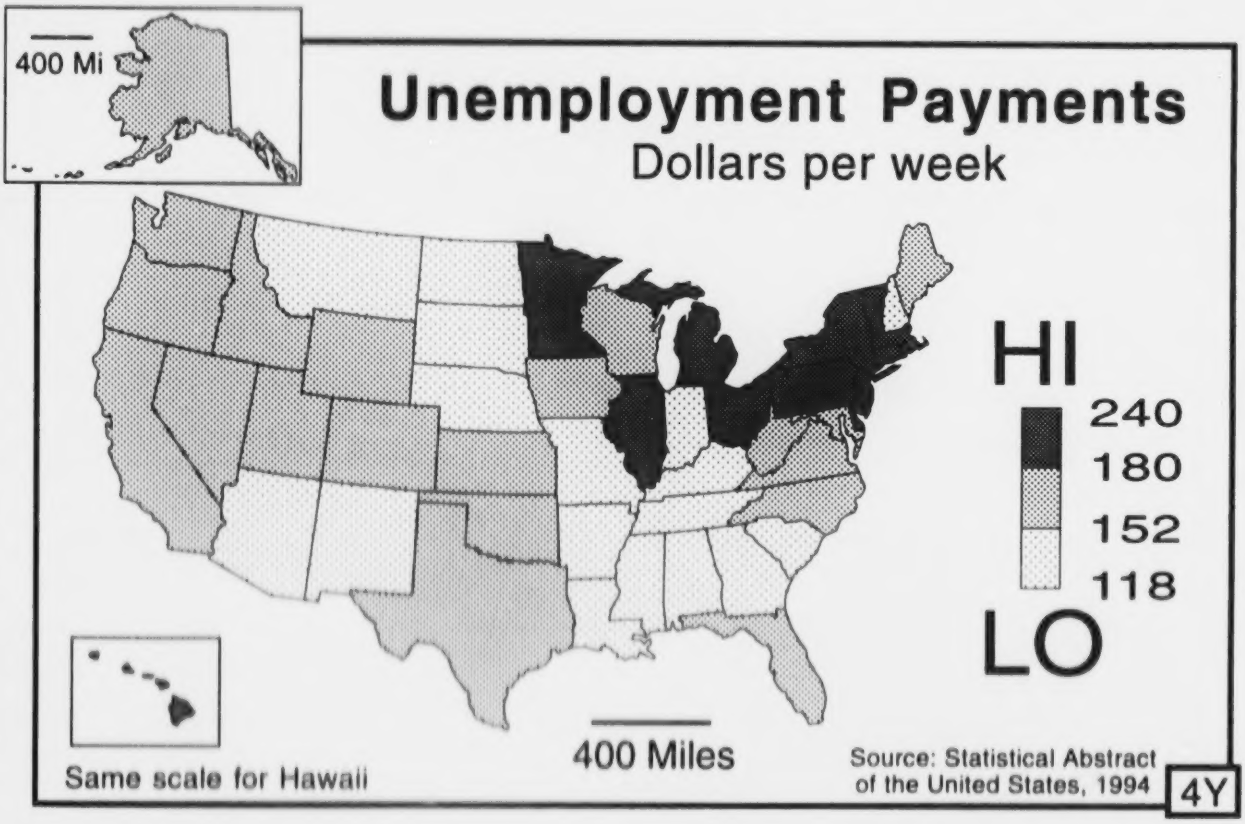
That is what a GIS does.

If the maps are the same scale, you can "cut out the middleman" and lay the maps directly on top of each other. This is the basic principle of a Geographic Information System (GIS). A GIS is a way of storing information in a computer with a common frame of reference, so that maps can be overlaid and compared with absolute precision. The overlaying process can be accurate to many decimal places. The results, however, are only as accurate as the original maps. That leads us directly back to a main point of this book, which is that maps are a means of communicating what we understand about the world -- that is definitely not the same thing as saying that maps are an accurate depiction of the world.

In short, you must know geography to avoid misinterpreting output from a GIS!

Unemployment Payments

Dollars per week

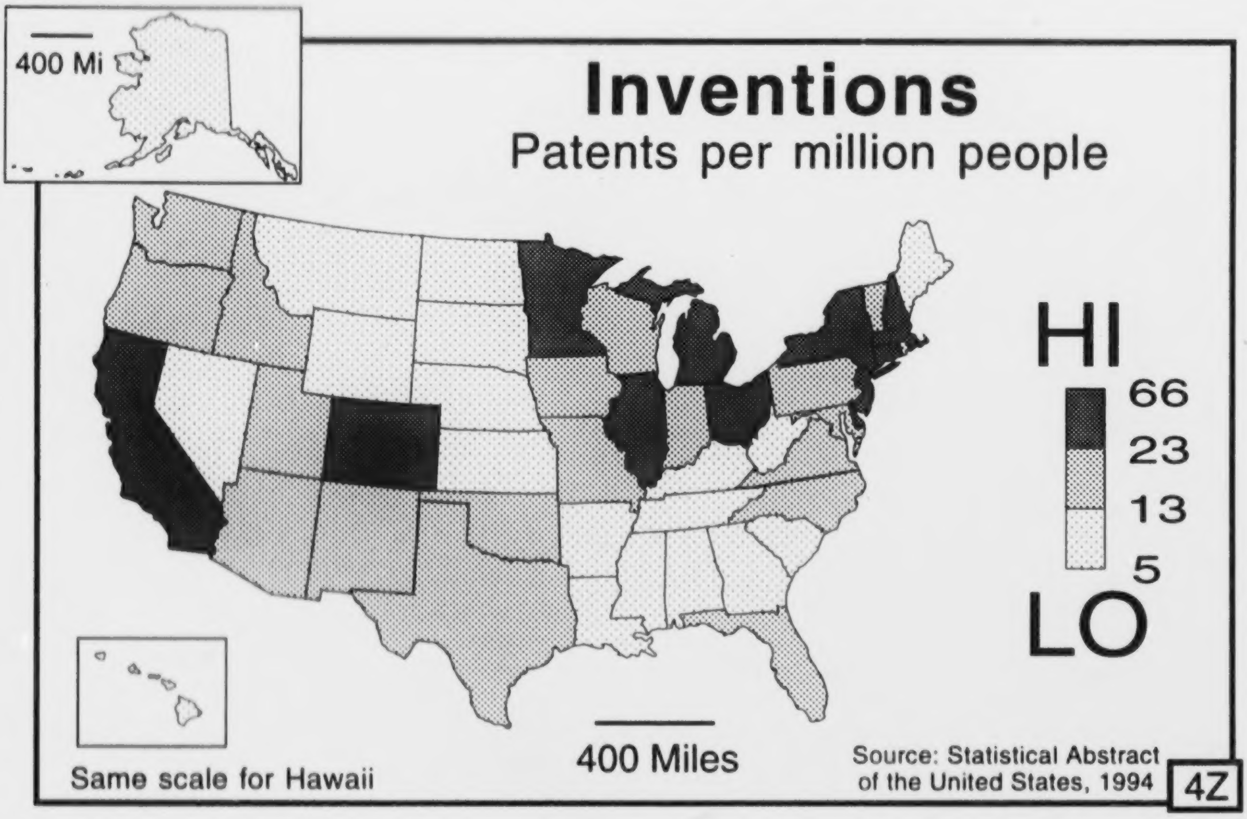

400 Mi
HI
240
180
152
118
LO
Same scale for Hawaii
400 Miles

Source: Statistical Abstract of the United States, 1994

4Y

Inventions

Patents per million people


400 Mi
HI
66
23
13
5
LO
Same scale for Hawaii
400 Miles

Source: Statistical Abstract of the United States, 1994

4Z

TEACHER'S GUIDE FOR TRANSPARENCY 4Y

This transparency raises some intriguing questions about perspective. One of the most subtle and yet most important questions about welfare is: from whose perspective should we make the map?

One approach is to examine the data from the point of view of state government. To do this, the map maker divides total welfare payments by the population of the state. The result is an estimate of the size of "the welfare burden" per person in each state. States with high payments per person must either have high taxes or spend less on other things, such as parks or police.

Another approach is to examine the data from the recipients' perspective. To do this, record the unemployment payment per recipient. These are the numbers we should compare in order to see how reassuring the "safety net" is to someone thinking about what happens "if I lose my job and have to go on welfare?"

There are other perspectives: unemployment payments per welfare-office worker (an estimate of the size of their caseload), or per taxpayer (an estimate of what it costs those who pay). In short, there are many ways to combine information in order to put it in perspective.

See how data were combined in order to make a printed map.

Activity: find some thematic maps in magazines or newspapers Ask students to try to figure out what data were combined to make the map. For example, a map of corn yield per acre must start with a measure of total bushels of corn and a measure of field size in acres. A map of death rates must start as a count of deaths and a total population. Don't be surprised if students make mistakes in trying to reconstruct original data. It is a sad fact that many maps have ambiguous legends.

It is also a fact that citizens (or politicians!) who cannot identify the original data that underlie a map cannot intelligently use the map to guide decisions.

That is another reason why we teach geography! (But it takes time to learn how to do this kind of map analysis well, so start early and reinforce often).

TEACHER'S GUIDE FOR TRANSPARENCY 4Z

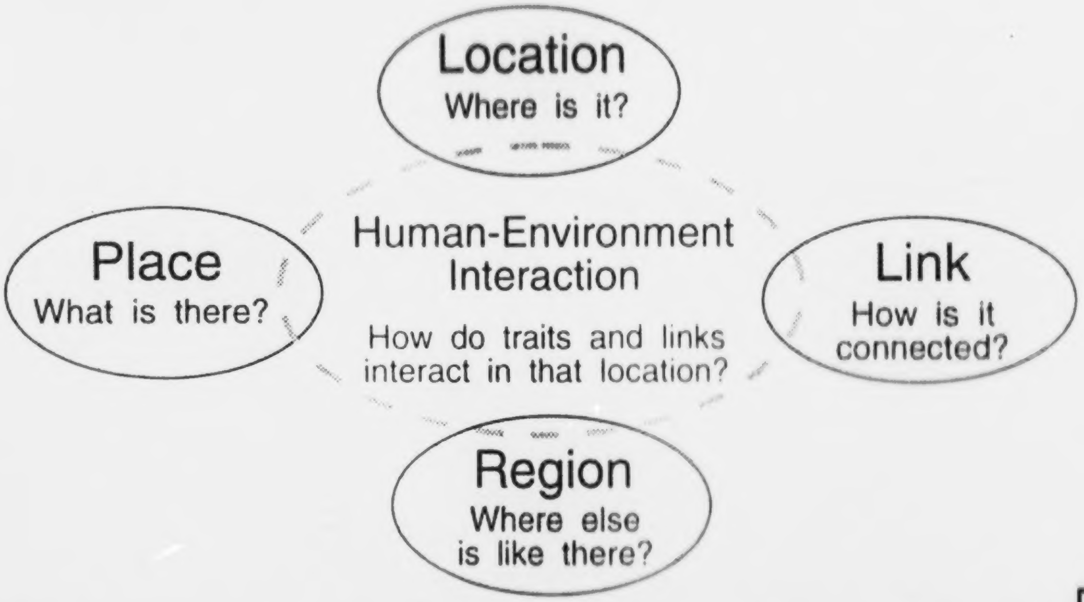
Inventions are what happens when an idea arises in an adequately prepared mind. Patents are what happens when inventors register their ideas with the Patent Office. This office investigates each idea, decides whether it is indeed innovative, and, if so, issues a document that allows the inventor to sue anyone who might try to sell a product based on the same invention. The goal is simple: to encourage inventiveness by guaranteeing that inventors will have a chance to gain the financial rewards for their new ideas.

Inventions can change the relative importance of places, often quite dramatically.

List ways in which an important invention changed the value of places.

Activity: ask students to list ways in which invention of the automobile made some places more important and others less so. For example, it made jobs in Detroit. It made petroleum a valuable commodity, which helped places like Texas and Kuwait. It made rubber tires important, which helped Akron and Malaysia. It made suburbs accessible and cities smoggier. It made canal towns less important. And so forth. Put plus and minus signs on a map to show the changes. Then do the same for air-conditioners, computers, other important inventions.

Basic Themes of Geography



Location
Where is it?

Place
What is there?

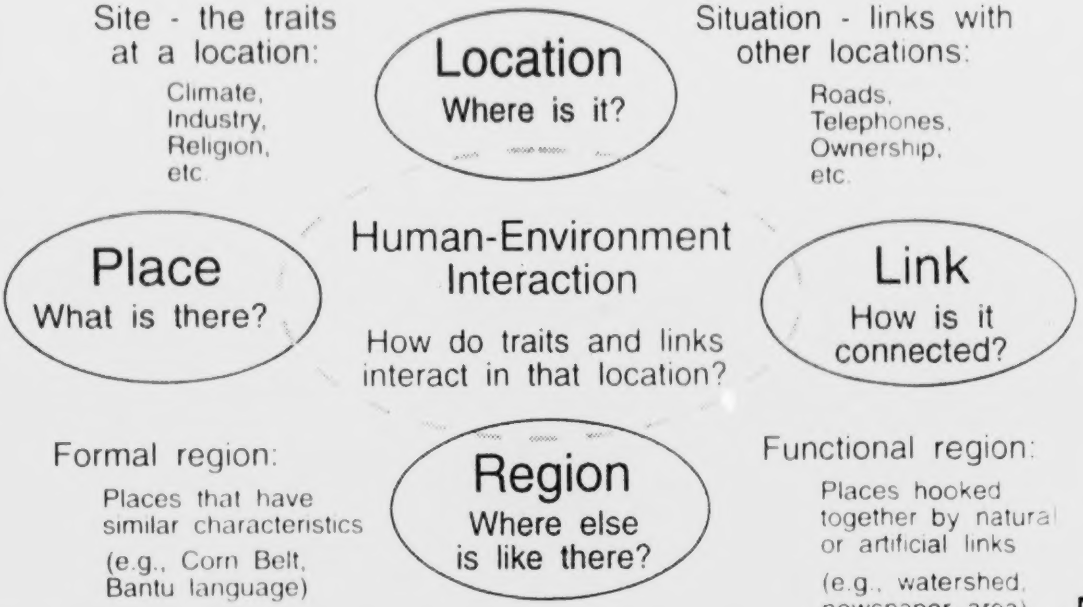
Human-Environment Interaction
How do traits and links interact in that location?

Link
How is it connected?

Region
Where else is like there?

5A

Basic Themes of Geography



Site - the traits at a location:
Climate,
Industry,
Religion,
etc.

Location
Where is it?

Situation - links with other locations:
Roads,
Telephones,
Ownership,
etc.

Place
What is there?

Human-Environment Interaction
How do traits and links interact in that location?

Link
How is it connected?

Formal region:
Places that have similar characteristics
(e.g., Corn Belt, Bantu language)

Region
Where else is like there?

Functional region:
Places hooked together by natural or artificial links
(e.g., watershed, newspaper area)

5B

TEACHER'S GUIDE, TRANSPARENCIES 5A AND 5B

Six Eastern haiku (to be read individually) and a Western free-verse poem (to be read downwards), trying to practice what I preach.

Pictures can help do
what bee does for cherry tree:
instill principle [al].

Letterbrush and hand
bend to inner discipline,
mind now free to soar.

Small mushroom can kill;
look closely, pick when ready,
cook just long enough.

On a foggy day,
shared bouquet of plum blossom
helps teach what bees mean.

Young bluebirds can watch
an eagle soar, but must move
their own wings to fly.

point a finger; when
all can name the trees they see,
then talk about them[es].

These diagrams? they can be
a crutch to help me
speak with a colleague,
a board, a principal;

a creed to keep me mindful
of the mental discipline
I've chosen (will-fully)
to practice (for this class).

poison, in the class room
(as in Clue!), they'd murder,
unless we'd "done geography"
for a month or two (or three),

building up a stock
of shared experience
for these transparencies
to tie together.

Better yet, start my own sketch,
ad lib, one cheerful day,
and ask the students,
to make it better,

using themes to help teach them
how to observe, and only then
naming the themes we have used
to see more clearly.

There are no suggested Activities based on these two Transparencies, because I really do not think they have much place in a typical class. See text for reasons.

Now, what do we do with the rest of this space? (It is of course bad stewardship not to use it all, according to nearly every teacher's grandmother!)

How about writing down some anecdotes, examples, or jokes you think might be useful to reintroduce a theme into a discussion if it has been absent too long?

Location:

Site or Place:

Movement or Link:

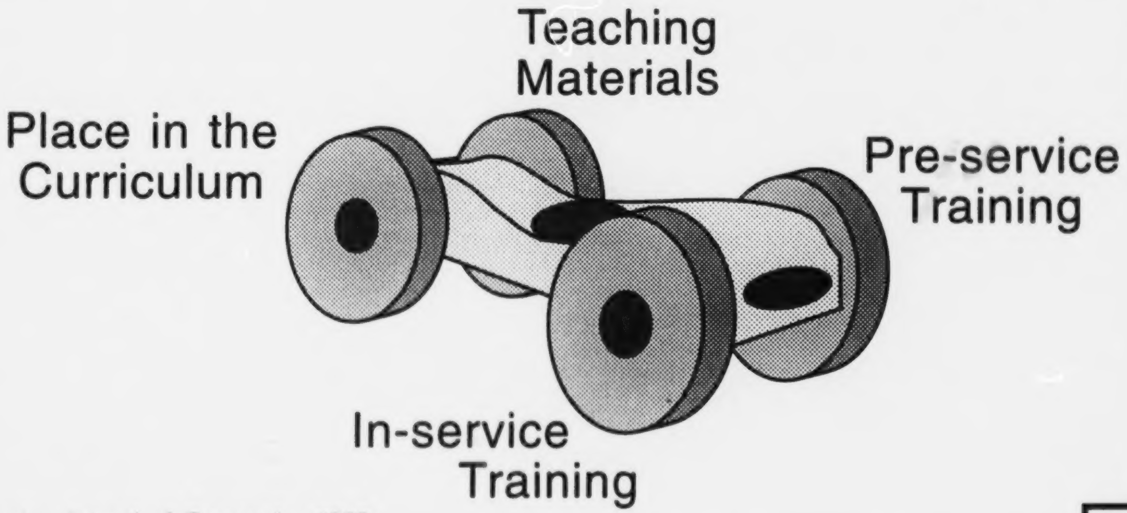
Region:

(OK, if you insist) Human-Environment Interaction:

Send your ideas;
start a page!

Educational Change is a Four-Wheeled Cart

The cart will not run if any tire is flat


Teaching Materials
Place in the Curriculum
Pre-service Training
In-service Training

Source: Journal of Geography, 1996

6A

What Can Yellow Pages Tell Us?

(Figure the number of some things per thousand people)
(Two examples are already done)

	Deming		Palm Springs	
Thousands of People	11		40	
Motels	11		134	3.4
Real-estate Offices	7	0.6	168	
Video-rental Stores	4		5	

6B

TEACHER'S GUIDE FOR TRANSPARENCY 6A

This transparency is designed primarily for administrative meetings, teachers' conferences, and other places where one must try to put the process of materials development and teacher training into perspective.

TEACHER'S GUIDE FOR TRANSPARENCY 6B

To thrive economically, every place needs at least one **bigjob** -- an occupation that brings money into the community (BIGJOB is an acronym that stands for Basic Income-Producing JOB). The usual approach is to produce something to sell to people outside the community. "Product" and "sale," however, can have different meanings in different places. Some communities, for example, might produce corn, pulpwood, or iron ore. Others might make athletic shoes, or missile parts. Still others might sell vacations, heart transplants, radio talk shows, or oil leases. And so forth, through a bewildering variety of products.

The question is: how do we teach students how to identify the bigjobs in a community? (The alternative is to memorize lists of products for all places, an immensely tedious prospect).

We could start by trying to find a book that classifies communities. For example, *Places Rated Retirement Guide* (by Boyer and Savigeau) evaluates a number of places as potential retirement areas. It lists Palm Springs, California, as one of the best places to retire. Deming, New Mexico, is near the bottom of the list.

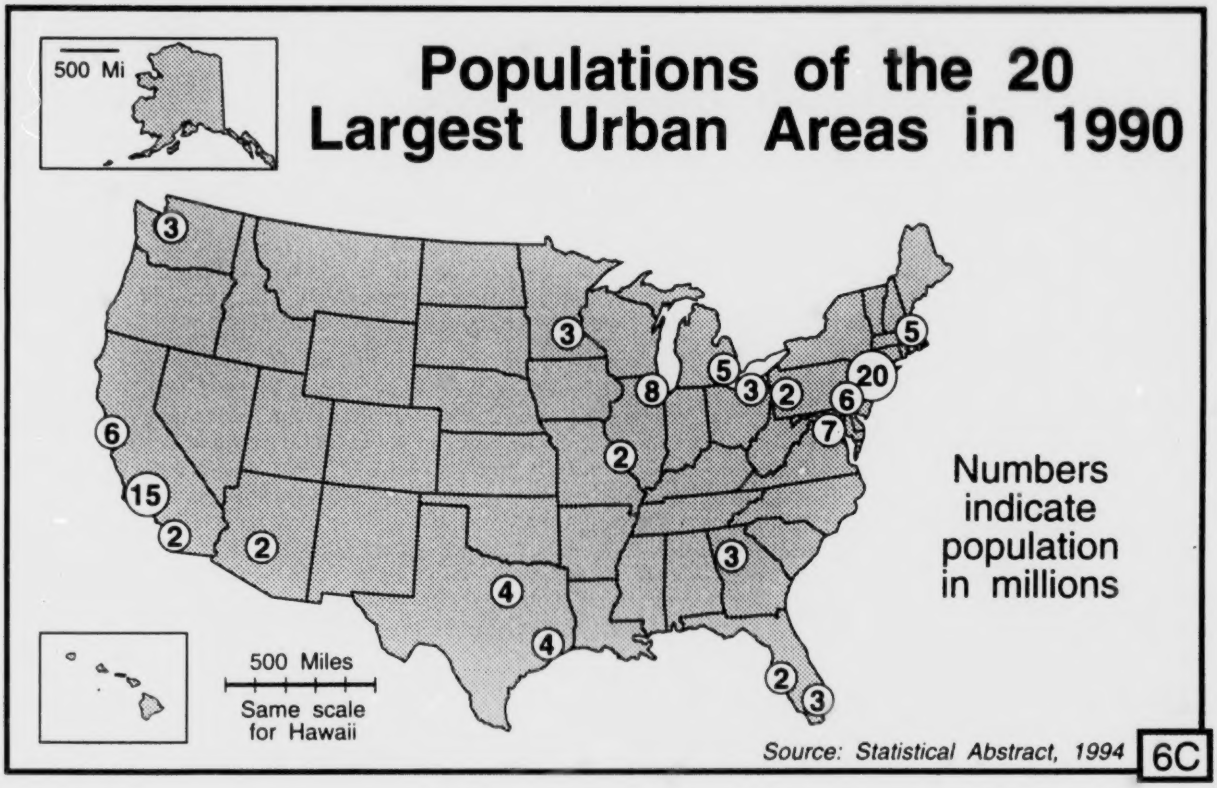
Both Deming and Palm Springs have some distinctive landscape features related to their role as places for people to retire and spend their Social Security payments, pensions, and stock dividends. Many people in both towns earn a living by providing services to retirees and vacationers. For that reason, those workers are a part of the community's bigjobs, and their places of work are part of the landscape that people built in order to do their jobs. The Transparency has data about some occupations that serve various kinds of retired people. Clearly, the two communities are different even though they both depend on retirees for their primary income.

Use phone book yellow pages to compare livelihoods in places.

Activity: A telephone book (printed or computerized) is a good resource for information about a community. Many occupations and structures in a community are related to its bigjobs -- the goods and services that the community sells or exchanges with other communities in order to get things it cannot produce. Have students pick a community and try to identify its bigjobs by looking at the yellow pages of the phone book.

For example, if you suspect that a South Carolina community gets income from forestry (a good guess in the Southeast), you might count the listings under headings such as "forestry consultants," "logging equipment and supplies," or "timber sales." It also pays to look in the government pages to see which offices are large. Count the number of phone numbers in occupation-related departments such as Mine Safety, Natural Resources, or the Bureau of Alcohol, Tobacco, and Firearms.

To put the results in perspective, calculate the number of various things *per thousand people* in each community. Then, compare those ratios with the national or world average (Transparency 6D). The product of this Activity might be a short report (e.g., to a group of investors) or a poster showing the bigjobs in a community.

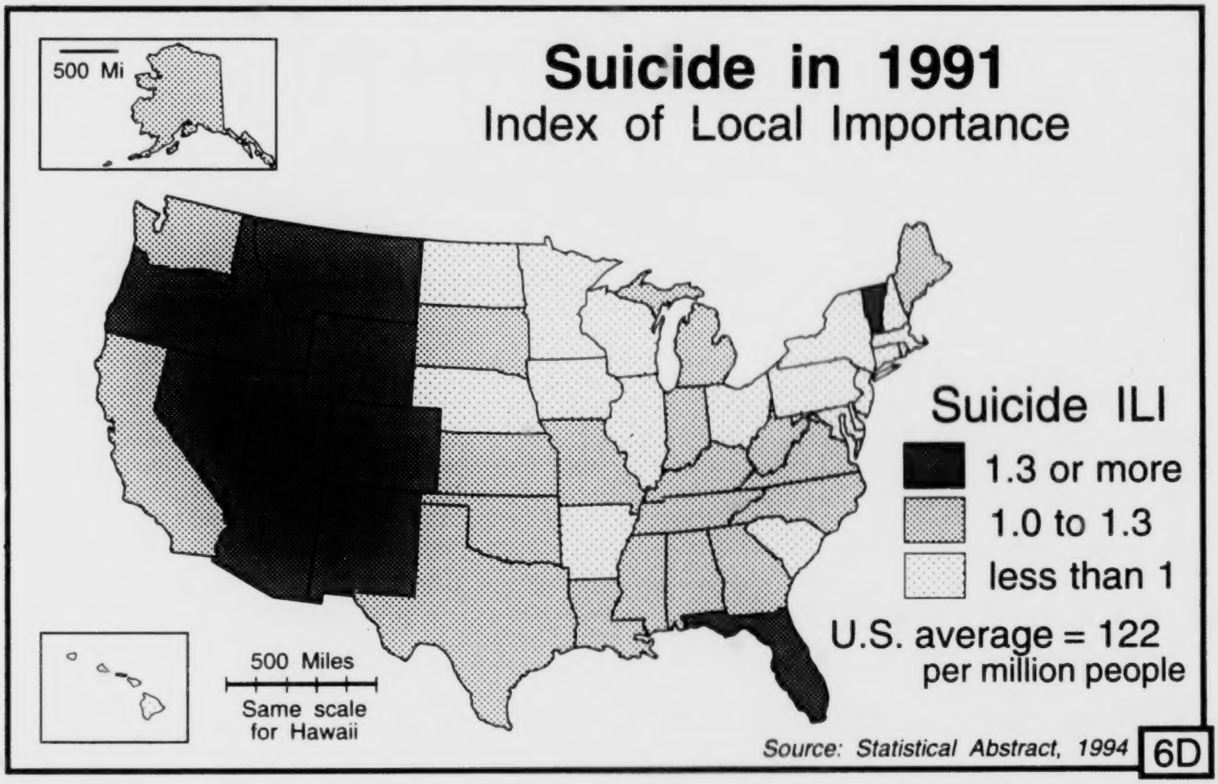


Populations of the 20 Largest Urban Areas in 1990

500 Mi
3
3
5
20
6
7
8
5
3
2
6
15
2
2
2
3
4
4
2
3
Numbers indicate population in millions
500 Miles
Same scale for Hawaii

Source: Statistical Abstract, 1994

6C



Suicide in 1991

Index of Local Importance

500 Mi
Suicide ILI
■ 1.3 or more
▨ 1.0 to 1.3
░ less than 1
U.S. average = 122 per million people
500 Miles
Same scale for Hawaii

Source: Statistical Abstract, 1994

6D

TEACHER'S GUIDE FOR TRANSPARENCY 6C

Since we can observe or measure places in many ways, it is not surprising that there are many different kinds of thematic maps. Each major "map vocabulary" (dot, isoline, choropleth, cartogram, etc.) is designed to show a particular kind of information. A valid way to show amounts of something such as population or steel production is with a *proportional-symbol* map (often called a *graduated-circle* map, though it does not always use circles). In this kind of map, symbols of different sizes indicate amounts in different places. This basic kind of map can be made in a variety of ways, some more abstract than others.

Stack pennies on a map to show locations of cities and their populations.

Activity: Find a large outline map of the United States (or project this map on a piece of paper and trace the outline, or pick another country or continent). Lay the paper on a table and stack pennies or poker chips on each city to indicate its population. Use one penny or chip for each million people. The resulting *proportional-stack* map is a graphic illustration of population geography. The activity also teaches basic place location. You can provide names and have students look them up in an atlas, or provide a table of names and numbers and have them create the base map. Proportional-symbol maps can be used for any topic that involves counts or other absolute numbers; other kinds of maps are better for percentages or other ratios (Transparency 1B).

TEACHER'S GUIDE FOR TRANSPARENCY 6D

An *Index of Local Importance* is a way for advanced students to compare places. This index (abbreviated ILI) shows how a local area compares to the average.

The Census tells how many people in an area have a particular characteristic, such as working in a clothing factory, speaking Korean, or being between 14 and 19 years old. These "raw" numbers, however, cannot say whether the local scene is typical or unusual. To make raw numbers easier to compare, we can figure some ratios (It's a great math-across-the-curriculum Activity!)

For example, in 1995, Bangladesh had about 117 million people and 56,000 square miles of land. Most of the land was usable for farming, although one-fifth of it was subject to floods. Iowa had about the same amount of land (also mostly usable for crops), but only 2.8 million people. To make those numbers easier to compare, calculate the amount of land per thousand people: Iowa had 20 square miles per thousand people, Bangladesh barely half of one square mile.

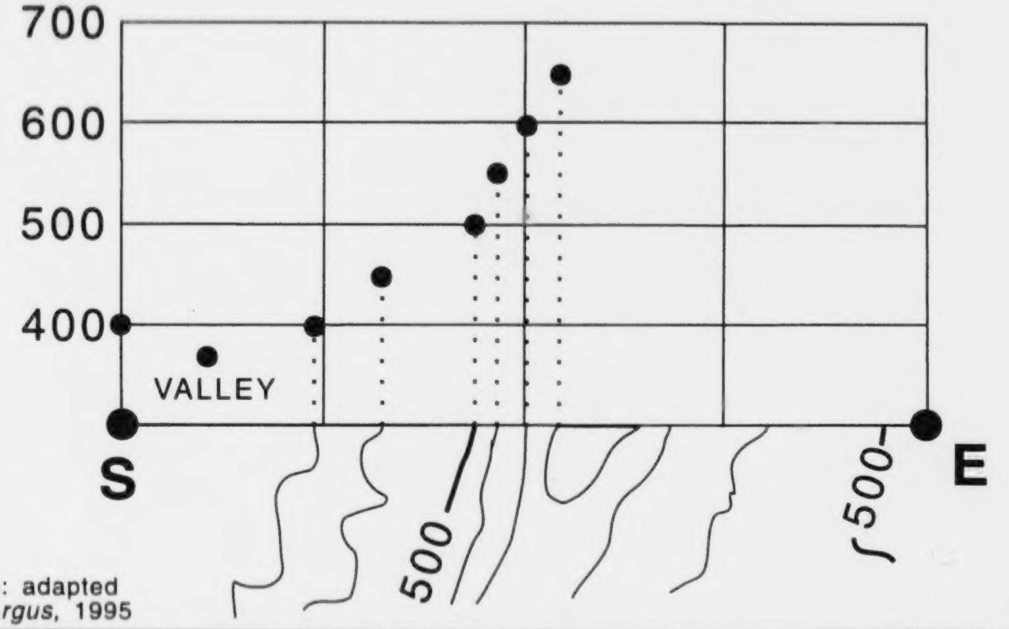
To make the comparison even more obvious, divide the ratio in each area by the world average. That gives the *Index of Local Importance*. In our example, Iowa had a land-availability ILI of about 2 (20.1 square miles per thousand people, divided by the world average of 10.3) This means Iowa had twice the world average land per thousand people. The figure for Bangladesh was 0.5 divided by 10.3, an ILI of about 0.05 -- it had one-twentieth of the average land per thousand people. Jordan had a land-availability ILI of 0.8 (4.2 million people on 34,000 square miles), South Korea only 0.08, but much of Jordan is desert.

Use ILIs to show how one place compares with others.

Activity: give students a table of data for 10-15 states and the nation (or use countries and the world average, for an international focus). Have them compute ILIs by dividing the state value by the national average WARNING: to be valid, ILIs must use **ratios**, not **raw data**.

Activity: make a choropleth map of ILIs, to allow comparison with other maps (Compare Transparencies 6D and 3O; it makes you wonder, no?)

Making a Straight-Line Profile

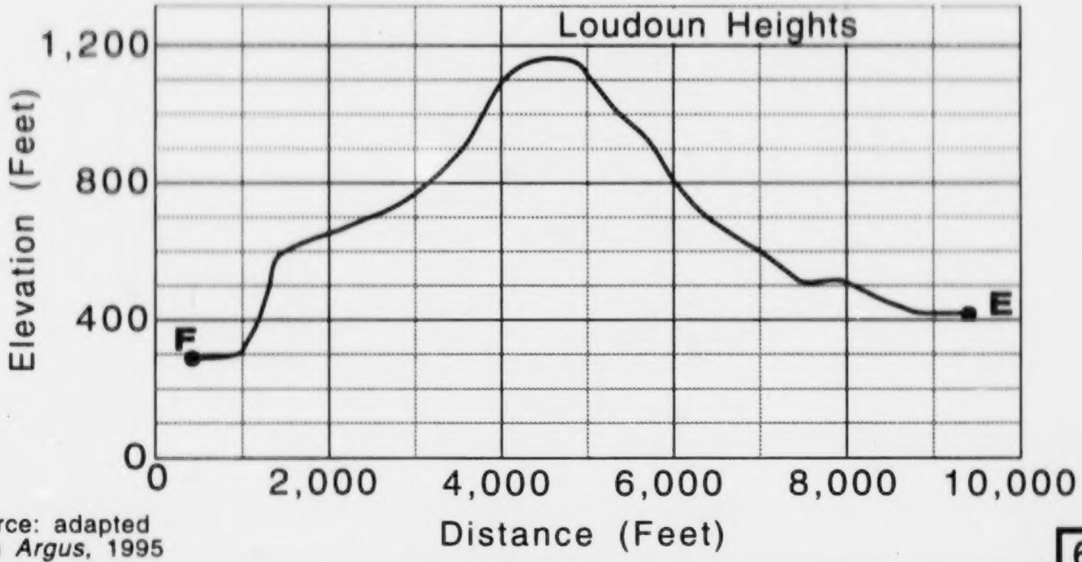

700
600
500
400
VALLEY
S
E
500
500

Source: adapted from *Argus*, 1995

6E

Profile of Loudoun Heights

(vertical exaggeration = 4X)



Source: adapted from *Argus*, 1995

6F

TEACHER'S GUIDE FOR TRANSPARENCY 6E

Here is a quick recipe for drawing a side profile (for more detail, see Activity P in ARGUS or NCGE Pathways Publication Number 1, *The Language of Maps*):

1) Find (or make) some graph paper that fits the scale of your map.

2) Position the graph paper with the horizontal axis directly on top of the profile line on the map. At every place where a contour line crosses or touches the horizontal axis of the graph, go "up" from the bottom of your graph and place a dot at the proper elevation.

3) Note the positions of hill tops and valley bottoms along the profile line. Place dots to show the horizontal positions and elevations for these key features. (Someone who is fairly good at profile drawing may skip the other steps and concentrate on these information-rich locations).

4) Draw a smooth line connecting the dots. Other contour lines on the map can help shape the details of the profile -- it should slope steeply where contours are close together and gently where they are far apart. This result is a line that shows the land as seen from one side.

5) Optional: Label key features of your profile with names. Add other information (e.g. forest cover, house density, underlying geology, etc.) with appropriate symbols if you wish to show the relationship between surface topography and other kinds of landscape features.

You could use this same grid with other maps, but it is usually better to design one to fit the specific scale and contour interval of the map you are using (the contour interval is the vertical distance shown by two adjacent contour lines).

Draw a side profile of a landform.

(see Transparency 4N)

Activity: draw a side profile of some land of interest -- a ski slope in Colorado, for example, or a local hill that might be used as a golf course or mini-bike trail. You will need a topographic map; write to the Map Distribution Center, U.S. Geological Survey, Federal Center, Denver, CO 80225, for a (free!) index map of your state.

TEACHER'S GUIDE FOR TRANSPARENCY 6F

This is a side profile of the ridge at Harpers Ferry (also shown in Transparency 1C). Some of the slopes are steep as a flight of stairs, and the ridge is a thousand feet high. Before the invention of internal combustion engines (for trucks and tractors) or dynamite (for clearing land and building roads), a hill of this size and shape was a real challenge. You could walk up, or ride a horse, but moving something like a 1200-pound cannon to the top was very difficult.

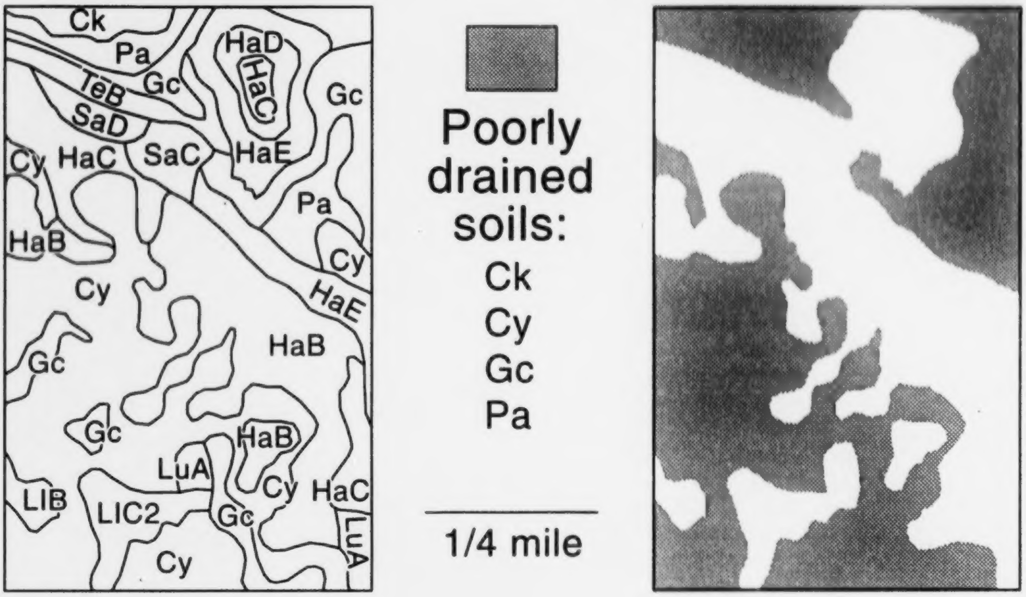
The town of Harpers Ferry is in the only gap through this ridge for scores of miles each way. The gap was made by the Potomac River; Washington, DC, is only a short way downstream. Is it any surprise that several of the bloodiest battles in United States history were fought in the vicinity of this town?

(more of the same)

Activity: find topographic maps for the area near Harpers Ferry, Chattanooga, Vicksburg, or other major Civil War battles. Have students draw side profiles of the terrain. Then discuss ways in which terrain influenced the course of the battles (and why it is not so important today). Looking at the interaction between terrain and history helps move the focus away from mere body counts. Or, if you want a non-military focus, do profiles of ski slopes or hiking trails.

Soil Map

Interpreted Map


Ck
Pa
HaD
TeB
Gc
HaC
Gc
SaD
Cy
HaC
SaC
HaE
Pa
HaB
Cy
Cy
HaE
Gc
HaB
Gc
HaB
LuA
Cy
HaC
LIB
LIC2
Gc
LuA
Cy
Poorly drained soils:
Ck
Cy
Gc
Pa
1/4 mile

Source: Soil Survey of Rice County, Minnesota, 1975.

6G

Describing a Newspaper Article
about an environmental issue

Prominent ___ ___ ___ ___ ___ Hidden ("buried")

Illustrated ___ ___ ___ ___ ___ Verbal

Factual ___ ___ ___ ___ ___ Opinionated

Logical ___ ___ ___ ___ ___ Chaotic

___________ ___ ___ ___ ___ ___ ___________

___________ ___ ___ ___ ___ ___ ___________

6H

TEACHER'S GUIDE FOR TRANSPARENCY 6G

Names can be misleading. For example, a soil survey is not just about soil.

Every person, family, and society has to make decisions about where to store things. Ask your students to list some things their parents store in "weird" places -- you know, like a flashlight in the underwear drawer, or a can of tuna under one leg of a table. In most cases, the "weird" place turns out to make sense in the context of available space and family needs.

The United States Government chooses to store environmental information of all kinds in the county soil survey. Want to know what areas are suitable for campgrounds? How big a storm comes once every 20 years? What places are good habitat for deer? What places would be hazardous for buildings with basement? What date is safely past the last frost nine years out of ten? A soil survey can tell you. About 2000 counties have one, and (write this down) **they are usually free to teachers** (Look for Natural Resource Conservation Service (or Soil Conservation Service, its former name) under Dept. of Agriculture in the phone book listing for the U. S. Government).

Each survey has a colorful county map and dozens of specific maps. These have soil codes on them, true, but they are printed on aerial photographs that show every road, tree, house, and pond. Post the map for a local area -- students will enjoy trying to identify features they have seen from the ground.

Color the suitable (or unsuitable) areas on a soil-survey map.

Activity: give students a copy of a soil survey map and a list of soils that are suitable or unsuitable for a specific purpose, such as house building or corn growing. The survey has that information, in tables that are tied to the map via short letter-number codes (it will make sense once you open the survey -- just ignore the technical stuff about permeability and all that). Have students color the suitable areas. Then (here's the kicker) go on a field trip to see if people are using land as they should.

The Transparency shows a piece of land that was used for a high-income housing subdivision; some of the houses have never been sold, because water got into their basements and caused wall damage. If the builders had consulted the soil map, they would have seen that construction on some of these soils was unwise. [What teacher can resist: "Isn't it fun to see rich people do stupid things?"]

TEACHER'S GUIDE FOR TRANSPARENCY 6H

Classify newspaper articles.

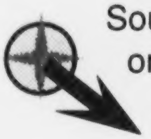
Activity: Describe a local situation -- an environmental question, for example, or a proposal to build a mall. For several weeks, have students cut articles, editorials, and letters from the newspaper and try to classify them according to several criteria: pro or con, logical or emotional, fact-based or just opinionated, etc. Variant: use scales rather than binary categories -- from 1 for strongly in favor to 5 for someone strongly against.

Evaluate maps in newspapers.

Activity: Take the maps from the newspaper clippings, post them on the board, and have students evaluate them according to several criteria: clear or confusing, easy or hard to read, proper or questionable use of conventional cartographic rules, fair or unfair in presenting the issues that affect nearby neighborhoods, etc. If there are few (or no) maps, write a letter to the editor asking why the paper did not put an issue of such obvious importance into its geographic context.

How to Give Directions

1 Name a compass direction, the route you're on, and a landmark ahead.



Southeast on 14th, toward the Library.

2 Give a distance and a warning feature.

go 3 miles cross Elm St.

3 Name a landmark and a "too far" feature.

at the Post Office; (Maple St. is too far.)

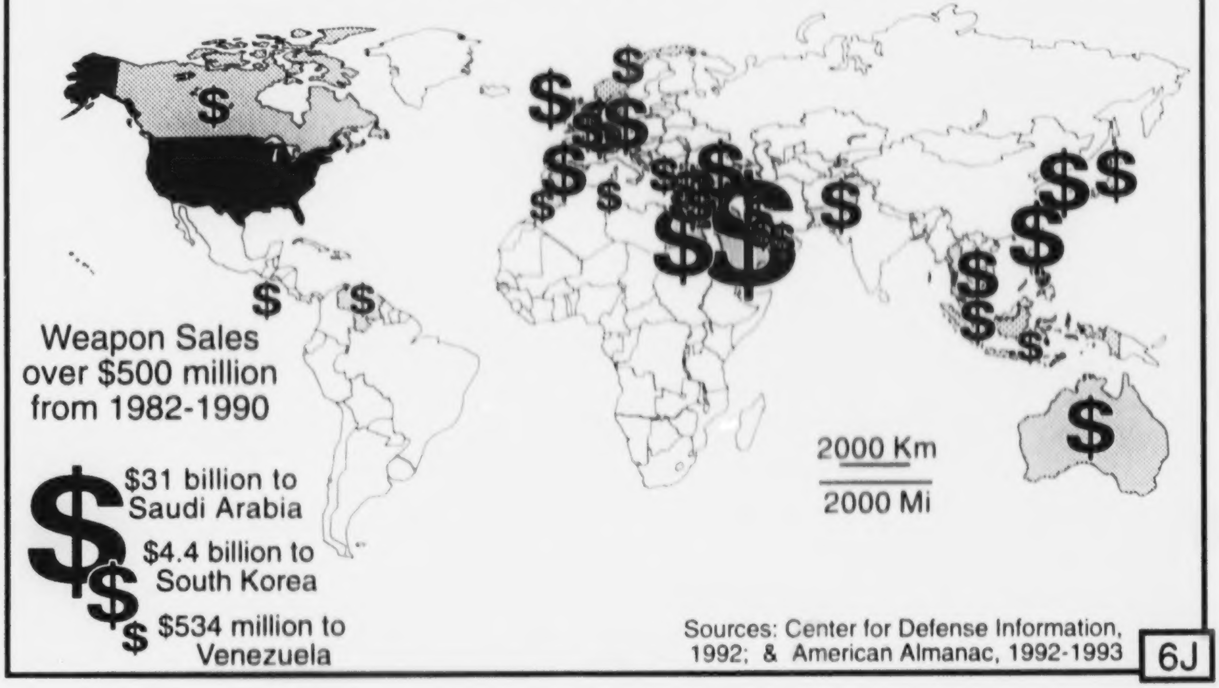
4 Describe the turn and the new direction.

Turn left, to go north on Green St. . . .

Continue to destination.

6I

Top U.S. Weapon Sales to Other Countries



Weapon Sales over $500 million from 1982-1990

$31 billion to Saudi Arabia

$4.4 billion to South Korea

$534 million to Venezuela

Sources: Center for Defense Information, 1992; & American Almanac, 1992-1993

6J

TEACHER'S GUIDE FOR TRANSPARENCY 6I

Using a road map is a fundamental geographic skill in late-20th-Century America. Satellites, Global Positioning Devices, and electronic maps may change the tools we use in personal navigation, but we will still need to translate a map view into "egocentric" directional words such as *left*, *right*, and *straight*.

For twenty years, I have been interviewing government officials in rural county seats from coast to coast. I drive to the edge of the town, call the office, set up the interview, and then ask for directions. My sample of 300-plus counties includes a truly astonishing assortment of "directions." For example:

> Are you familiar with [town-name]?
> *No, I've never been here before.*
> Do you know where the supermarket is?
> *No, I've never been here before.*
> Well, go out on the highway and head toward the high school.
> *I've never been here before. Which way is that?*
> Go out on the highway and head toward town.
> *OK, I can manage that.*
> Go about three, maybe four stoplights or signs,
> *OK, what then?*
> Then turn left where the old Amoco station burned down in '88.
> *What's there now?*
> You know, next to where the guy married Dr. Jones' daughter
> *How far is that from here?*
> About ten or fifteen blocks. Then go half a mile; we're behind a bunch of stores. You can't miss it.
> *Wanna bet?*

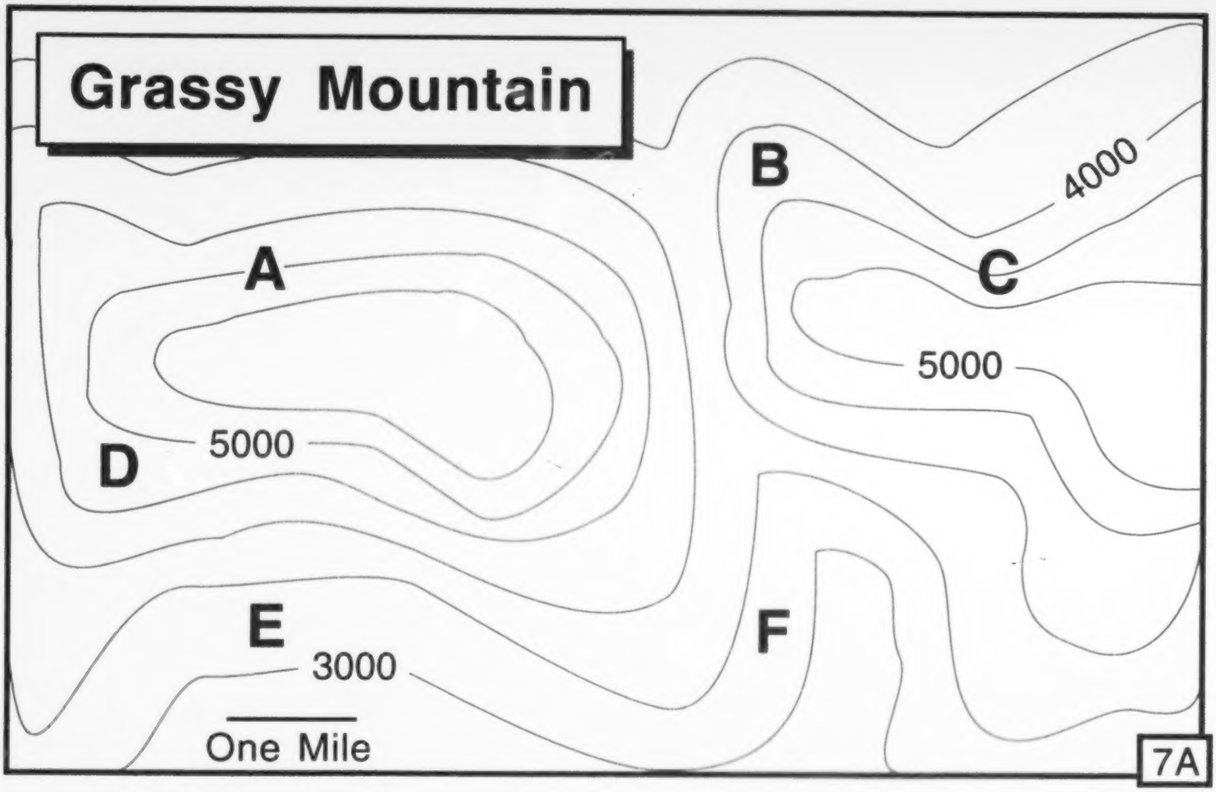
Activity: Hand out copies of a map showing an area of interest. Then ask students to plan a route from one specified location to another. Have them describe that route as if they were giving directions to a driver. In general, a good set of directions should have:

Give good directions.

- the number and name of the road the driver should take
- the compass direction and a visible landmark to go toward
- distance in miles (which can be estimated visually or read on an odometer) rather than stoplights or blocks; add those later
- a "warning sign," preferably a cross street, just before the turn
- a prominent landmark at the key intersection (e.g., Library)
- the name and number of the street to turn on ("get in the left lane; you turn on highway 10 when you get to the Library)
- the direction of the turn, in both *egocentric* and *geocentric* terms ("turn left, so you'll be going northwest")
- a prominent street or landmark that says "you've gone too far" (e.g., "if you see the Citizen's Bank, you are past the turn")
- and so forth until the arrival at the destination.

TEACHER'S GUIDE FOR TRANSPARENCY 6J

This one is fairly self-explanatory; I saw some figures in a newspaper and was curious about where the countries were. (I am bothered that we sell hi-tech weapons to so many dictators around the world. But isn't that what "geography for life" means -- to use geographical methods to interpret information? This map is going to help me judge some candidates in the next election.)



MAP INTERPRETATION SKILL QUIZ

This map shows an area in the Appalachian Mountains. This area has the narrow valleys and rounded summits that are typical in that region. On the day of the test, you will be given part of a map like the one above. The italicized words or letters in each question might change to a similar word or another letter; the rest of the question will stay the same. You can practice your skills with this map, and you can find topographic maps of other places and practice the same kind of questions with them.

_______ Which lettered point is farther ***east*** than all the other points?

_______ What cardinal direction would you go from point ***A*** to point ***C***?

_______ What is the letter of the point that is ***northwest*** of point ***F***?

_______ What is the real-world distance (within 1/2 mile) from point ***A*** to point ***B***?

_______ What is the letter of the point that is about ***3 miles*** away from point ***C***?

_______ Is point ***A*** higher or lower than point ***C***? Or is it at the same elevation?

_______ What cardinal direction would you head to go ***downhill*** from point ***E***?

_______ What is the topographic position of point ***D***?
A) Summit B) Slope C) Valley D) Plain

TEACHER'S GUIDE FOR TRANSPARENCY 7A

A quiz such as this example can be handed out ahead of time and modified slightly on test day in two ways: by replacing italicized letters, words, or phrases, or by using a different map of the same general kind. Here are several forms that show how the same ideas can be adjusted for different grade levels.

Elementary: You will be given part of a map; look at it and tell me:

_____ What is the name of the town in map sector *D4* on the map?
_____ In what letter-number map sector is point *D* located?
_____ What cardinal direction would you go from point *A* to point *C*?
_____ What is the letter of the point that is *north* of point *F*?
_____ How far is it in the real world (within one mile) from point *A* to point *B*?
_____ Is point *A* higher or lower than point *C*? Or is it the same elevation?
_____ What cardinal direction would you head to go downhill from point *C*?
_____ Is point *D* on a hilltop, on a slope, or in a valley?

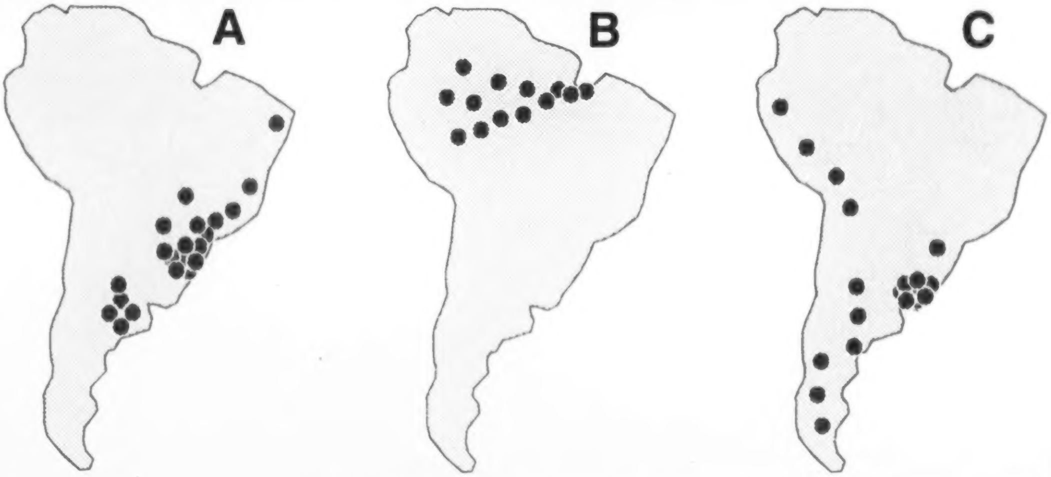
Intermediate: You will be given part of a map with some lettered points on it:

_____ Print the letter-number designation for the sector that contains point *B*.
_____ Print the letter that is closest to latitude *34°11'N* and longitude *104°23'W*
_____ Print the true azimuth (within 10 degrees) from point *B* to point *C*.
_____ Print the letter where you would be if you saw point *F* to the *southeast*.
_____ Print the shortest road distance (nearest mile) from point *A* to point *C*.
_____ Print the representative fraction (RF) scale of a map with a verbal scale of *one inch equals 500 feet*.
_____ Print the approximate elevation of point *G*.
_____ Print the letter that best describes the topographic position of point *D*.
A) Summit B) Ridge C) Spur D) Slope E) Draw
F) Bench G) Valley H) Hole I) Plain J) Pass

Advanced: You will be given a portion of a map with some labelled points on it.

_____ Print the magnetic compass reading (within 5 degrees) from point *B* to *A*.
_____ Print the letter of the map point from which you would see point *A* at a magnetic compass reading of *263* degrees.
_____ Print the amount of time (within ten minutes) it would take to go from point *A* to point *B* at a speed of *40* miles per hour.
_____ Print the real-world area (nearest square kilometer) represented by a square centimeter on this map.
_____ Print the elevation difference between point *C* and *I*.
_____ Print the average gradient (nearest 5 percent) of a direct path from point *A* to point *B* on the map.
_____ Print the elevation of the highest point along a straight line from point *F* to point *J* on the map.
_____ Sketch a side profile and print **yes** if you would (**no** if you would not) be able to see point *C* while standing on the ground at point *A*.

Which map shows: Corn/soybeans
Sheep/goats
Rubber
?



7B

ECONOMIC GEOGRAPHY MATCHING QUIZ

Match the appropriate lettered map with the following crops and briefly state your reasons:

Corn and soybeans require at least a four month frost-free season, adequate rainfall, fertile soil, and an economy that can use them for animal feed or export them to other countries. Which map shows where these crops are grown in South America, and why do you think so?

____ (letter)

Sheep and goats need grass or shrubs that grow throughout the year, or land that can be used to grow hay for winter feed. Because these animals are not very profitable, they are seldom raised on the best ground, unless people have a long tradition of animal-raising. Which map shows where these animals are raised, and why do you think so?

____ (letter)

Rubber comes from a tree that grows in the equatorial rainforest. Which map shows where this crop is harvested, and why do you think so?

____ (letter)

TEACHER'S GUIDE FOR TRANSPARENCY 7B

A matching question can be phrased in many different ways, depending on what kind of knowledge a teacher wants to evaluate. This example has its primary focus on the link between agriculture and climate. That is why the question provides a short explanation about each crop (so that the question does not just test familiarity with the nature of the crops).

If, on the other hand, a teacher wants to emphasize recall of the plant and animal traits as well as the climate pattern, the test might simply ask:

> Which map shows where corn and soybeans grow? Why do you think so?
>
> Or just: write the letter of the map that shows where rubber is produced.

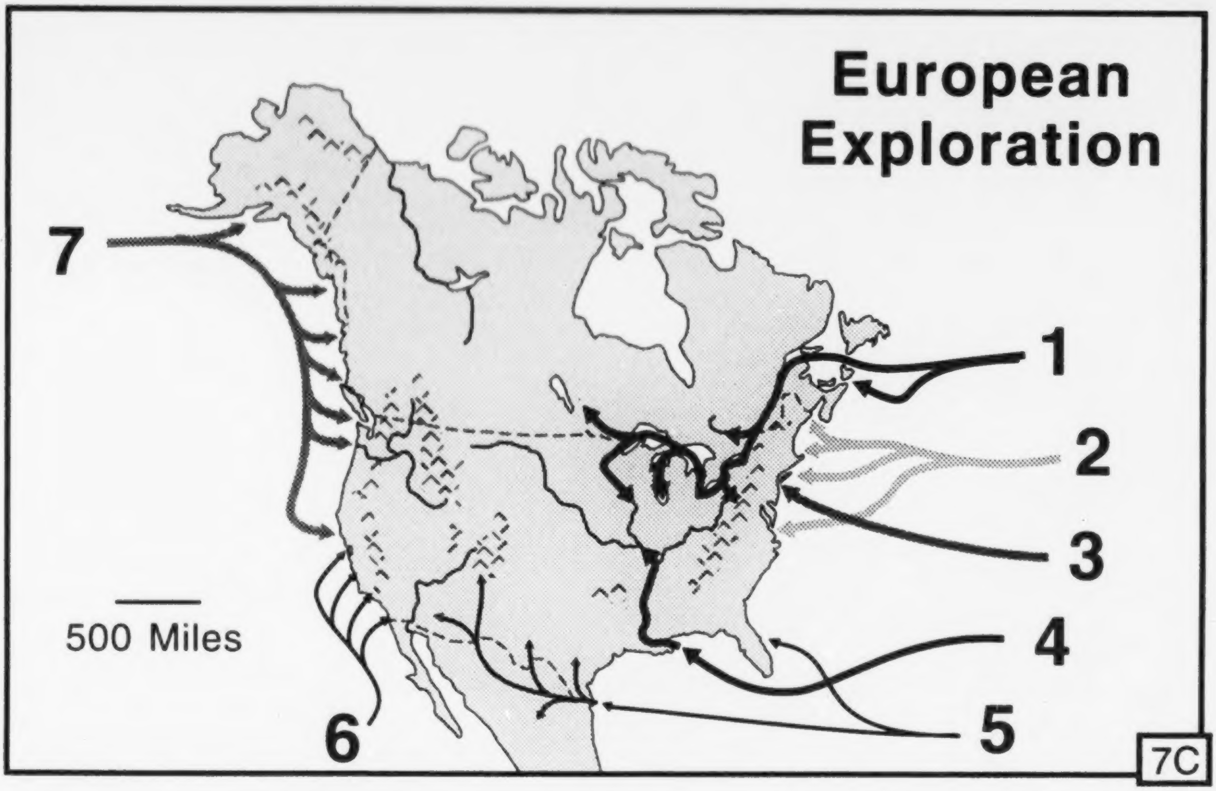
Finally, to emphasize a full set of spatial relationships, ask students to draw a line for the Equator, put dots in desert areas, show the Andes Mountains with upside-down V's, and then use those ideas to match crops with maps and explain why.

In any case, South American agriculture clearly shows the influence of environment, but that is not the only variable. The mass of sheep and goats in Uruguay reflects a long cultural tradition of one primary land use even while neighboring countries with similar land grow other crops.

Other geographic patterns that lend themselves to matching questions include:

- climate -- *World Weather Guide,* USA Today *Weather Almanac*
- mineral deposits, rocks -- *Goode's World Atlas*, or a good geology text
- plants and animals -- maps in Reader's Digest *North American Wildlife*
- soil types -- maps in McKnight *Physical Geography*
- environmental hazards -- *State of the Earth Atlas*
- houses -- *This Remarkable Continent, Atlas of Cultural Features*
- early settlement -- Dorset, Penguin, Facts on File, or Rand McNally *Atlas of American History*
- ethnic groups -- *We the People*, Facts on File *Atlas of Contemporary America*, or census reports for specific states or metropolitan areas
- languages -- same as above, and *Atlas of the World Today*; spoken samples in some CD-ROMs like *EnCarta* (it wouldn't hurt to learn how to say or recognize "Excuse me" and "Thank You" in several languages)
- industry -- *Oxford Economic Atlas, Goode's World Atlas*
- crimes -- *Atlas of Contemporary America*
- professional and college sports -- Rooney, *Atlas of American Sport*, Shortridge *Atlas of American Women,* Rand McNally *Official Baseball Atlas* (also has maps of stadiums, use like Transparency 4C)
- major department stores -- Laulajainen, *Spatial Strategies in Retailing*
- political activities -- *Latitudes and Attitudes*, Martis *Historical Atlas of Political Parties in the United States Congress*, or U.S. Geological Survey, *Electing the President: 1789-1992*; call 1-800-USAMAPS.
- musical styles -- some new CD-ROMs, or make a tape
- vacation spots -- travel guides by AAA, Mobil, Fodors, Smithsonian, etc.

Other topics include migration streams, population pyramids, current news spots, environmental issues, maps from state atlases and history books, excerpts from diaries or poems, etc. This list is intended to be illustrative, not exhaustive; ARGUS and other major curriculum projects usually have quite a few matching-style activities. BUT, please, choose well; do we really want to focus on flags, tourist attractions, minor politicians, funny names, or other pure trivia?



The map above shows seven general pathways used by explorers and settlers from five European nations. Describe the process and consequences of the settlement depicted by arrow number *5*.

Stated like this, the question is too vague for easy evaluation. It could, however, be followed by a clarifying question, which would simultaneously narrow the range of possible answers and provide some guidance for students. Note the wide range of possible directions that question could take:

What country does this arrow represent? Why did they choose the kind of land they tended to move to?

What kind of people came along this route? Was it a large or small group? Why would these people leave their home country at this time in history?

What major goals did they seek in North America? How did that influence their choice of land?

What are the major environmental conditions in the region they entered?

What kind of Native American people already lived in the areas they entered? What did those Native American people do for a living?

How did these immigrant people divide land? What consequences does that land division have for future users of the land?

What kind of houses and other structures did these immigrants build? How well did these structures fit with the local environment?

What did these immigrants do for a living? What resources in the area made that possible?

What kind of political organization did they adopt? How well did that organization fit with the local environment?

How would you describe the success of this migration? What aspects of the local environment helped or hindered the people moving in?

What aspects of the modern landscape in that region are results of the time when these particular people entered North America?

TEACHER'S GUIDE FOR TRANSPARENCY 7C

Some more sample essay questions, aimed at different levels and outcomes:

Provide a map with several numbered locations; ask which one would be best for some new facility -- a store, highway, gas station, sewage treatment plant, etc. -- and why. "I'd put the restaurant at 3 because there's a big highway and more people would be driving there."

Provide a map and ask which numbered location has a particular hazard -- hurricane, earthquake, frost, drought, etc. -- and why it occurs there. Or reverse the question and ask what hazards are likely in a specified location. What might people do to reduce the risk? "That area has earthquakes, so look for a wooden frame house on a solid foundation rather than a brick house with big windows. Or at least ask if the house was reinforced, because brick houses have problems in earthquakes."

Provide a map of an urban area and ask where a given feature -- truck stop, baseball stadium, high-rise office, oil refinery, etc. -- might be located and why that location would be suitable. "The oil refinery is probably at place C. That's near a river, and near a railroad, and it's east of the city, where prevailing winds would blow smoke away from the city."

Provide a map of a continent with a location marked by an X. Ask what kind of people live there, what they do for a living, and what traits of the local area (or what influences from other areas) help give that place the traits it has. "People there might raise cattle for a living, because it is too dry for most crops and I don't think there is any mineral deposit there. Probably there are not very many people, because dry areas without big rivers usually do not have big cities."

Provide a map with a marked location. Ask students what they would take with them if they were travelling (or moving) to that location. Ask them to justify their list by citing features in the local environment that would fit the items they were taking. "I'd take a raincoat, because that place has a lot of rain." "I probably want to learn some French before I move there, because that is what government officials speak, but after I get there I'll ask my neighbors to teach me some words in the local language -- people around there speak many different languages."

Provide a map with a marked location. Ask what kind of problem is happening in that area and what people can do to reduce the problem. "This area lost jobs when clothing factories closed. We should send someone from the department of education to help train people for new jobs." "That area has some problems because a lot of people moved there from Vietnam after the War; there weren't many teachers who spoke Vietnamese, and some children had a hard time at first. We should have night classes in English and maybe try to find some land that could be a park with a Vietnamese theme -- we could hire some of the new people to help design and run the park. That would give them jobs while they learned more English, and it would also give English-speaking people a chance to find out about the new immigrants."

Note that all of these questions have four feature in common.

1) Each question deals with a real place.
2) Students must understand at least one broad-scale geographic pattern.
3) Students must think about how environmental, economic, and social factors are linked together in that place.
4) The question tests knowledge and skills that can help a vacationer, student, worker, employer, or citizen make everyday decisions.

Community Profile - Components

Reference map - Where is the place?
What is it like? What is connected to it?
What resources are there?

Population - What kind of people are there?
How many? Where from? How old?
How is the population changing?

Economy - What bigjobs bring money in?
What services are available?
How is the economy changing?

Features - What else is interesting?

7D

Community Profile - Criteria for evaluating

Research
- Did you find relevant information?
- Did you judge how important it was?

Graphics
- Did you select proper data for mapping?
- Did you use proper map symbols?

Presentation
- Did you organize your work well?
- Did you arrange text and graphics neatly?
- Did you use good grammar and spelling?

Bibliography
- Did you cite your sources properly?

7E

TEACHER'S GUIDE, TRANSPARENCIES 7D AND 7E

An individual or group project is a good way to organize independent geographic exploration. By its very nature, a project is a "synthesis" activity -- it requires students to bring a variety of knowledge and skills to bear on a specific issue. The key is to make the expectations very clear at the outset of the activity. These should span the range of learner outcomes, from factual knowledge to skills in organizing and presenting results. It helps to make an explicit list of evaluation criteria, such as on the Transparencies or the expanded list below:

Stating a problem and formulating hypotheses

Did you clearly state your problem (the landscape feature or map pattern you are trying to explain, or the issue you want to explore)?

Did you clearly state your hypothesis (your idea of what might be a valid explanation of the feature you are studying)?

Did you choose an appropriate study area? Is it typical, are data available?

Did you find appropriate factual information about your area? Did you focus on major features, or did you fall into the "tourist trap" of commenting only on the exotic or unusual?

Mapping your data

Did you choose an appropriate map scale and projection, so that the base map does not introduce unnecessary distortion in your message?

Did you choose appropriate kinds of background information, so that the thematic message is easy to see and interpret?

Did you manipulate your data in appropriate ways (e.g., dividing total amounts by population in order to get amount per capita)?

Did you choose appropriate symbols for your thematic message? Do the symbols fit the innate nature of the thing you are mapping?

Analyzing your map

Did you make a reasonable analysis of the geographic patterns on your maps? Did you compare it with other appropriate maps if available?

Does your analysis fit with generally accepted theories of geography? Did you cite other peoples' observations or analyses if appropriate?

Did you draw reasonable conclusions from your analysis?

Presenting your results

Did you express your conclusions in ways that allow for reasonable disagreement on points where the data are inconclusive?

Did you try to identify questions that warrant further investigation?

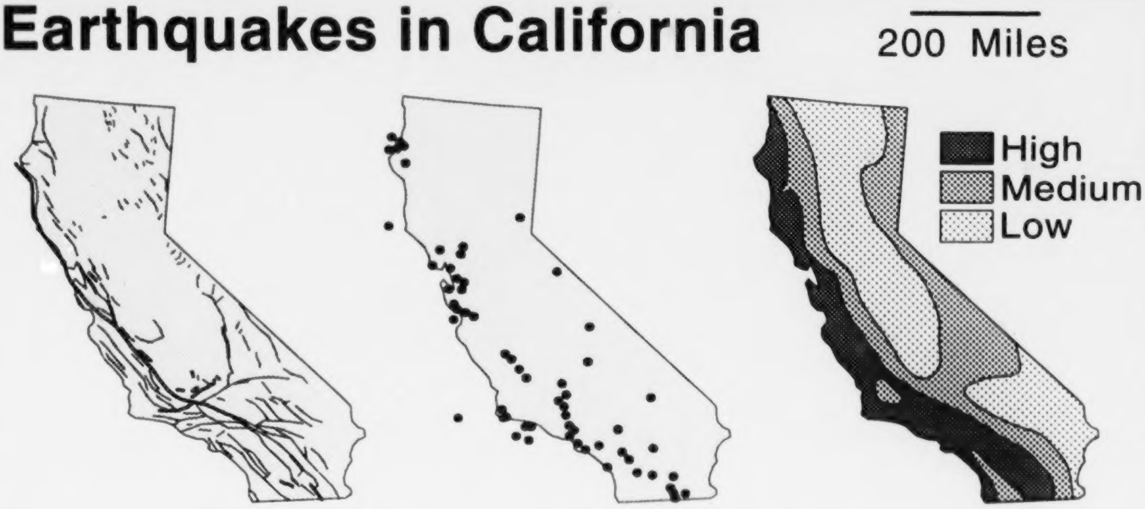
Did you organize your presentation in a logical and interesting way?

Did you write clearly, concisely, with good grammar, no unnecessary jargon?

Did you cite your sources completely and correctly?

The exact list of outcomes may vary from project to project; the transparencies talk about a rather straightforward community profile. A different list of outcomes would be appropriate for an investigation of a community issue with geographic implications (such as a proposed location for a park, a solid-waste disposal area, or a transit system). Here, the focus would be on finding and evaluating relevant information about the population density, land use, economic health, and other traits of the communities that might be affected by the plan. One should also evaluate whether the results were presented in a manner that would be understandable by the people who might be affected.

Earthquakes in California



Active faults
— last 200 years
— last 2 million years

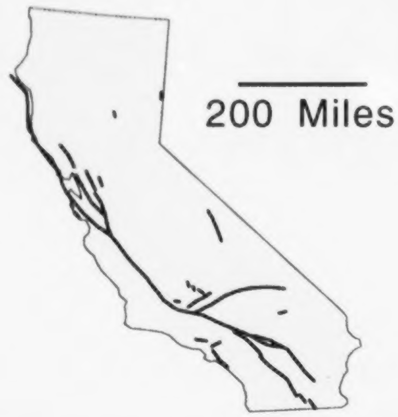
Major earthquakes 1769-1972

Expected earthquake intensity

Sources: Skinner & Porter, 1992; Donley et al, 1979; E.Hart, 1977; USGS 1962; Jennings,1987.

8E

Alquist-Priolo Special Studies Act



Potentially active faults under the Alquist-Priolo Act

Source: E.Hart, 1977.

This 1972 law requires the State Geologist to:

> "Delineate . . . appropriately wide special studies zones to encompass all potentially and recently active traces of the San Andreas, Calaveras, Hayward, and San Jacinto Faults, and such other faults . . . that . . . constitute a potential hazard to structures from surface faulting or fault creep."

8F

TEACHER'S GUIDE, TRANSPARENCIES 8E AND 8F

Much of California is a risky environment for buildings and people.

Some of the risk is due to the unique climate of the state. It is located at the northern edge of the Subsidence region (remember Transparencies 4H and 4I). The zone of sinking air (the Subsidence) moves northward in summer, bringing hot and dry weather to most of the West Coast from Mexico to Oregon. In winter, the Subsidence shifts southward. San Francisco has about six months of rainy "winter;" Los Angeles about three; San Diego has only a few rainy weeks.

This seasonal shift of the Subsidence brings four distinctive climatic hazards to much of the state of California:

- in summer, smog accumulates in the hot and dry air
- in autumn, fires burn in vegetation that has dried all summer
- in winter, floods and mudflows occur when rain falls on slopes that were burned bare in autumn
- in spring, coastal cliffs collapse when waves beat against shores that have lost their sandy beaches during winter storms

These seasonal hazards occur somewhere in the state nearly every year. As a result, many Californians have what some geographers call a "disaster culture." They expect climatic hazards every year, and they plan for them, and therefore they don't have enough political energy left to plan for longer-term hazards, such as earthquakes.

Part of that complacency stems from the way people perceive the earthquake hazard. A tough law, the Alquist-Priolo Special Studies Act, requires sellers to notify buyers if a house for sale is in an earthquake-prone area. The real-estate industry realized how this law might hurt house prices and sales. It therefore lobbied the legislature to adopt fairly lenient criteria for "earthquake-prone area." These political pressures are evident on maps. The first map on Figure 8E shows known earthquake faults; the middle map shows historic earthquakes; the third map shows earthquake risk. Meanwhile, the map on Figure 8F is the official map of earthquake-prone areas. Clearly, the apparent pattern is different, depending on what criteria and map symbols a map maker uses.

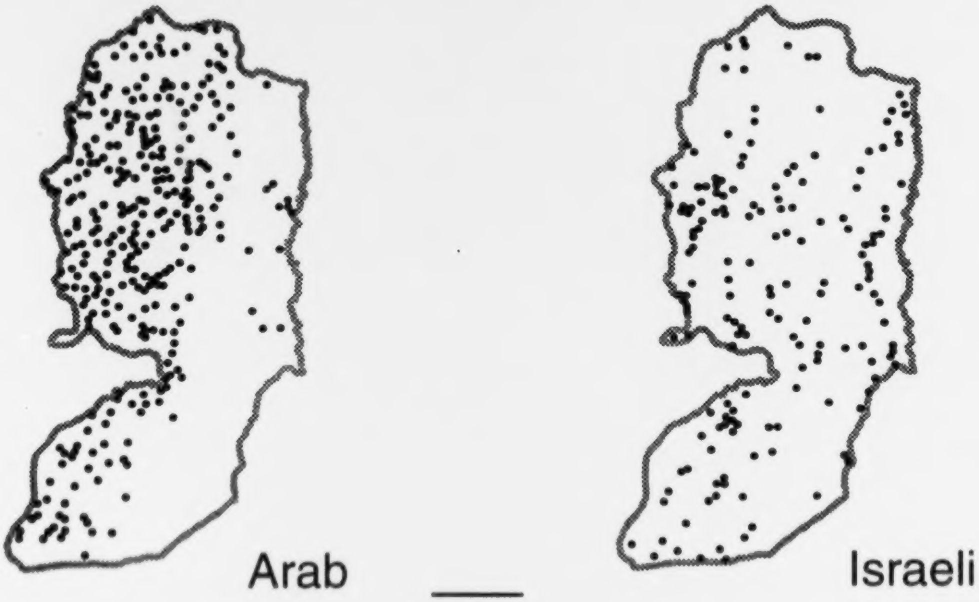
This is a major goal of liberal education, to give people enough background to evaluate the maps and data that are presented to them in the course of their everyday lives as citizens.

Write a warning about a risky environmental condition.

Activity: ask students why real-estate people might prefer to use Figure 8F in following the rule about notifying buyers about earthquake risk. To counter a TV-induced cynicism about "evil big business," ask about the legal implications of declaring a house to be in a quake-prone area if it is not really in danger. "Wouldn't that unfairly deprive a house owner of profit?" The issue is too complex to accept either extreme, and careful comparison of these maps can help students toward a more reasonable middle ground. Have students try to draft a fairly worded warning to potential homebuyers.

Map-evaluation skills are a major goal of geographic education. To make sure that students acquire the skills needed to make reasonable comparisons and interpretations of different kinds of maps, a textbook author or course designer should clearly shows the skills that are taught within each major unit of the course. Authors who do not provide this kind of information for textbook buyers are not doing their job; teachers deserve better.

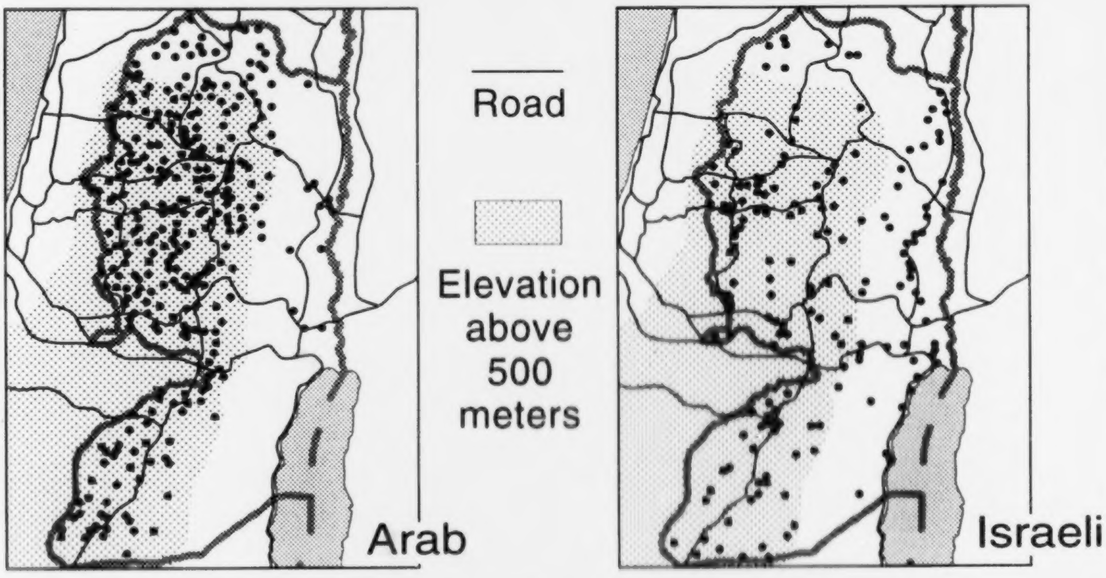
West Bank Settlements in the Mid 1980s


Arab
Israeli
20 km

Source: CIA maps, 1983, 1986, 1989

8C

West Bank Settlements in the Mid 1980s


Road
Elevation above 500 meters
Arab
Israeli
20 km

Source: CIA maps, 1983, 1986, 1989

8D

TEACHER'S GUIDE FOR TRANSPARENCY 8C

These two maps show the geographic pattern of Arab and Israeli settlements in the region known as the West Bank (the generally dry hills on the west side of the Jordan River). Shortly after the Israelis captured this area, the government began a program of settlement.

The maps on Transparency 8C are thematic maps. They show that the Arab and Israeli settlements have quite different geographic patterns. The older Arab settlements are "unbalanced." The pattern has a pronounced "bias" toward the west side of the area. The newer Israeli towns are more even. You might describe them as arranged in "strings" in many parts of the area.

See if a map pattern is balanced or biased.

> Activity: use this map (or any other dot map with a distinctive pattern). Have students try to draw a line that divides the area roughly in half. The goal is to separate the area into a half with only a few dots and a half that has most of the dots. Then, the student can count the dots in each half and add them together to get a total for the entire area. When that is done, the student can make a generalization about the pattern.

For example, one might draw a diagonal line through Charlotte, North Carolina, and count shopping centers on each side of the line. The conclusion? "about 85 percent of the major shopping centers are in the southeast half of the urban area." Similar analysis leads to the conclusion that "more than 70 percent of the African-American people live in the northwest half of Charlotte." Together, these two statements could be cited as proof that different population groups in Charlotte do not have equal access to big shopping centers. Before judging too quickly, however, one should study other maps, in order to see if factors such as industrial areas, parks, or road patterns help explain the imbalance.

This is one way in which map pattern analysis can contribute to a public discussion of issues of fairness and efficiency.

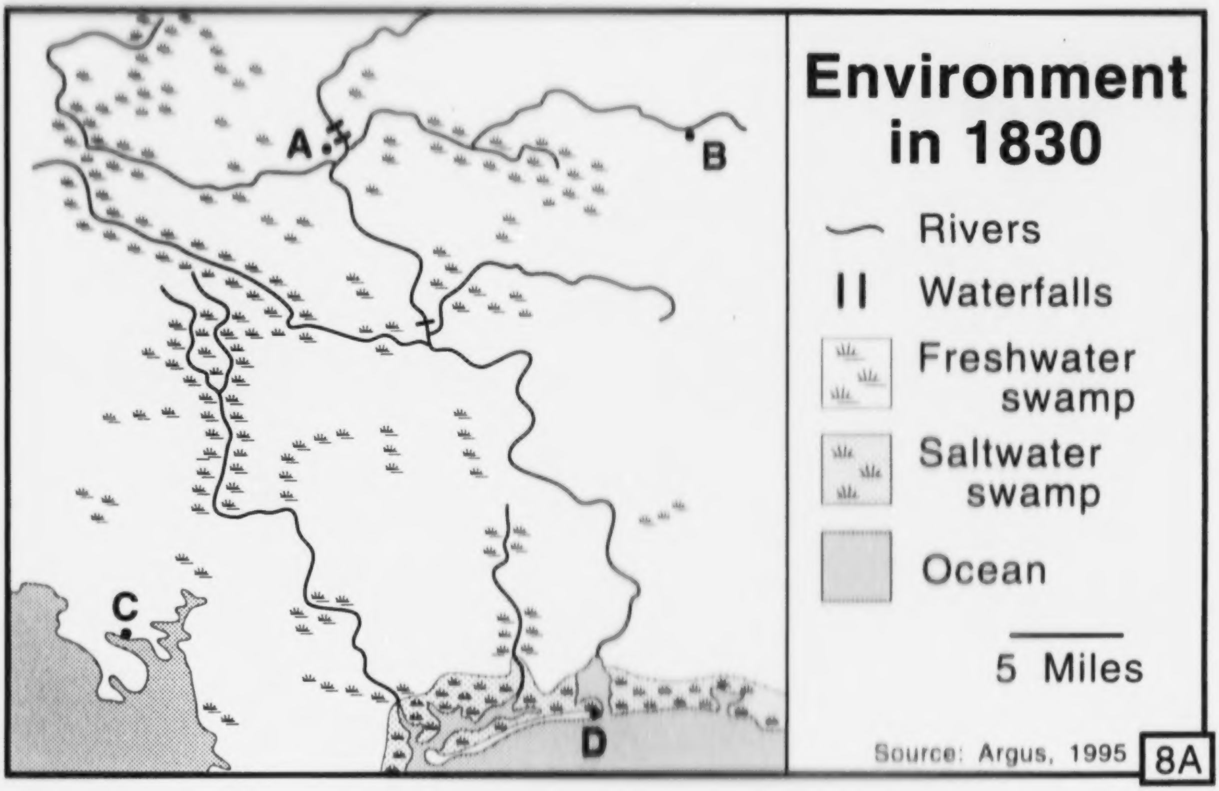
TEACHER'S GUIDE FOR TRANSPARENCY 8D

The reasons for geographic patterns are usually easier to see if a thematic map includes at least a little bit of reference information. These maps have the same thematic information as Transparency 8C, along with a few roads and a pale gray shading in areas of high elevation. With this background, the map reader can see that the majority of the Arab settlements were at higher elevations. This makes sense, because the weather gets cooler and rainier as you go higher up a mountainside. Both of those trends would be advantageous for farming or grazing in a hot and dry region such as the Middle East.

The Israeli settlements, by contrast, appear to have been located for defensive or military reasons rather than to take advantage of favorable climate. Most of them are along major roads, with a sizeable number along the border with Jordan.

Make maps with different amounts of reference information, and see which ones communicate best.

> Activity: Find some interesting data that occur at discrete points -- e.g., burglaries, street festivals, car accidents, video-rental stores, or schools with winning football records. Have students make a bare thematic map of the data by putting points in appropriate places on a blank outline map of the area. Then have different groups add different kinds of background information -- streets, rivers, political borders, landmarks, etc. Finally, ask students to compare the maps and decide what kind of background helps communicate the main message best.


Environment in 1830
A
B
C
D
Rivers
Waterfalls
Freshwater swamp
Saltwater swamp
Ocean
5 Miles

Source: Argus, 1995

8A

Canal System
Lowell, MA
1850
PAWTUCKET FALLS
MERRIMACK R.
CONCORD R.
N
Waterways
Textile Mills
Direction of flow
1/4 Mile

Source: Argus, 1995

8B

TEACHER'S GUIDE, TRANSPARENCIES 8A AND 8B

The location of a town is both historical event and geographical fact. At a specific point in time, a specific group of people decided to put a town in a particular place. That is historical fact, often immortalized by a plaque or statue in a park or other prominent place.

Ask whether a town would have been built there anyway.

Activity: Describe the origins of a town that is familiar to your students. Then ask whether the town would be there if that particular event (General Dingbat building a trading post, or whatever actually happened) had not occurred on this site at that particular time.

In some cases, the answer is no. But in many cases, someone else eventually would have used the location because it had some clear advantages: a good site for a fort, a valuable mineral deposit, etc. The advantages of a particular location fall into two broad categories: site advantages (favorable characteristics in the local area) and situation advantages (good connections with other areas). These advantages can change through time, for many reasons.

Discuss which site would be best for a settlement.

Activity: Tell students that they are on a boat heading for America in 1830. Then project the Transparency and ask students to discuss which lettered location they would choose for a settlement (this Activity is from the 1968 High School Geography Project, as modified and incorporated in the 1995 ARGUS materials).

Site A?

Site A is not very promising from an agricultural point of view; it is swampy and hard to reach. Waterfalls would be an important asset in the early 1800s. Water can be taken out of the river coming from the north, carried in canals across the site, used to drive waterwheels in a mill, and released back in the other river.

Site B?

Site B has dry land and fresh water. It may be the best for farming, but it is not very accessible from the ocean. Flooding seems to be no threat, and the lack of swamp would have looked like a health advantage in a time before antibiotics.

Site C?

Site C has good ocean access, reasonable protection from storms, and perhaps some cropland. It would probably be the preferred site for a port or fishing village, although there is no obvious source of fresh water. The jaggedness of the coastline implies a rocky and rugged site (though this is not certain).

Site D?

Site D is probably the most dangerous from a construction point of view. It is exposed to ocean storms and has little dry land; it may not have a source of fresh water. It might be a good fishing area, however, and it would probably be the preferred choice if military security were still a concern.

Aha!

Site A is a real place

There's a good reason why Lowell is located where it is

This is not a hypothetical situation. Rotate Transparency 8A 90 degrees counter-clockwise, so that the top becomes the west edge. It now shows the area around Salem and Lowell, Massachusetts. By 1830 the government of the young United States was well established. The frontier was beyond the Mississippi River; farmers on rich land in Ohio and Illinois were sending grain and meat eastward. New England farmers were leaving their rocky land and moving to cities or to the frontier. Immigrants from Europe included people who knew how to build factories and work in them. Site A is Lowell, which soon became one of the most famous milltowns in New England. Thousands of people worked in water-powered mills on an elaborate system of canals (as shown in Transparency 8B). Site B is Derry, a small farming town that has become a minor industrial center since Interstate 93 was built north from Boston. Site C is Salem, a fishing town with a distinguished history and a good harbor but little chance for growth. Finally, site D is now a resort service area for people coming to the beach.

Evaluating Buildings along a Street

STREET ______________________________

BLOCK ______________________________

Compared with what we saw at the first stop, the buildings that I see on this block are:

SMALLER ___ ___ ___ ___ ___ LARGER

CLOSER TOGETHER ___ ___ ___ ___ ___ FARTHER APART

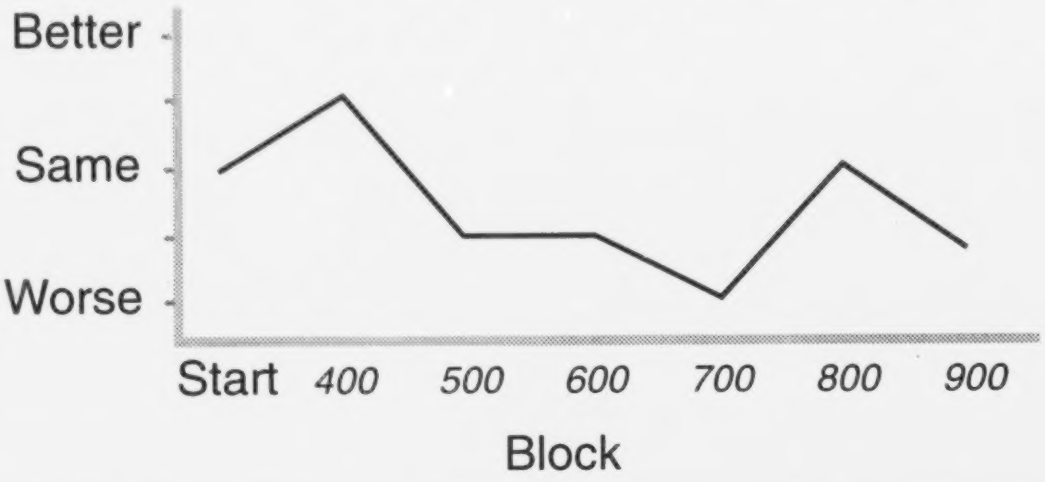
BETTER CONDITION ___ ___ ___ ___ ___ WORSE

________________ ___ ___ ___ ___ ___ ________________

________________ ___ ___ ___ ___ ___ ________________

7F

A Graph of Building Condition along *Washington* Street



7G

TEACHER'S GUIDE, TRANSPARENCIES 7F AND 7G

During the days or weeks before a field trip, discuss the goal of the survey, the procedure, the criteria to be used, and the product.

Goal: to observe building condition (or tree height, or wildlife diversity, or ethnic persistence, or land productivity -- in short, practically any of the kinds of impressions that we note and use to compare places). These observations will be made in such a way that we can put the data on a graph or a sketch map of the route.

Procedure: to describe what we see at the first stop, and then use that description as a yardstick for evaluating the next stops.

Criteria. One can open a discussion of criteria in a variety of ways: by using slides to illustrate the criteria, by asking students to select criteria from a list or to propose their own criteria, by assigning committees to devise criteria and explain them to the rest of the class, etc. The real purpose of this discussion is to get students to realize that the criteria used in making a map or graph are human inventions. As such, they can range from useful to worthless, from fair to biased, etc.

Product: a map or graph of some measurement of the real world, gathered in a systematic way and subject to evaluation by a teacher or peer group.

On your way to the field-trip destination (e.g. a new Wildlife Research Center or a stadium), stop the bus and announce the starting point of the graph.

Record what you see at the first stop, and use that as a yardstick for future observations.

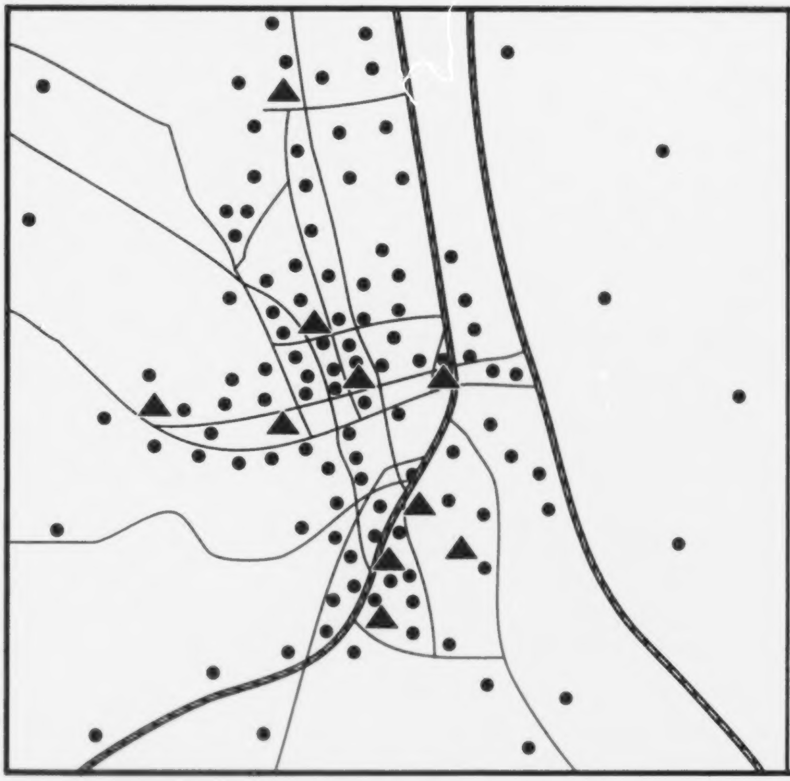
Activity: At the first stop, the goal is to write and/or sketch what you see, with enough accuracy that your description can be used as a yardstick for comparing future sites. Note the height, density, and condition of the buildings in the middle of the block. Mark down any specific clues that you think are especially helpful. This set of buildings will be a reference for other observations. From here on, you are to record how the buildings (or the trees, the soil, the churches or restaurants, or whatever is being observed) compare with the first stop.

When you get back to the classroom, you will make a set of three strip-maps or graphs to show the size, spacing, and condition of the buildings along the route.

This kind of disciplined field observation can be even more effective if students try to devise their own classification ahead of time rather than just following a predetermined set of categories. A teacher could have a list like the above in mind while conducting a rather open-ended discussion before the field trip. One could even have the students design an observation form like the example on the Transparency. All of these steps help tie the field experience into the classroom.

A disciplined form of observation does not automatically preclude serendipitous events while in the field. Offer a prize for the funniest sign a student observes, the most interesting haiku a student writes, or the most attractive sketches that students make in trying to record what they see. The students can even design quizzes for each other; immediately after the trip, ask them to write questions to elicit memories of what they saw.

By all means evaluate the product of a field trip; that is the single most important step in setting the tone for future field trips. The irony is that formal class evaluations or informal comments often say that doing this kind of "work" along the way is just as much "fun" as just riding the bus and doing "whatever."

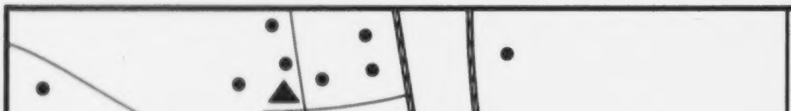


Video Rental Businesses in Elmira, NY

- ▲ Video Rental
- • 500 people
- = Major highways
- — Other roads

Source: *Argus*, 1995

9A



Video Rental Businesses in Elmira, NY

- ▼ "Flics-R-Us"
- ▲ Other stores
- ☆ Proposed store
- • 500 people
- = Major highways
- — Other roads

Source: *Argus*, 1995

9B

TEACHER'S GUIDE, TRANSPARENCIES 9A AND 9B

The dots on this map show the pattern of population in Elmira, New York. This city used to be an important producer of picture tubes and other television components. The decline of American television industry hit Elmira hard. People lost jobs. Many people did not have enough money for vacations or expensive clothes. Ironically, conditions that hurt travel agents and clothes sellers can help other businesses. For example, video-rental stores provide a useful service, especially for families where a person is looking for a job, or where both mother and father work at low-pay or temporary jobs.

Activity: Imagine that a company has asked for a permit to build a new video store. The yellow pages in the phone book show the locations of existing video stores (triangles on the map). Ask students to decide which star is in a better location for a new store. There are several steps in the process of using maps to analyze the potential market for something. The first two steps are done for this example.

1) Find a basemap. (A dot map of population is good.)

2) Mark the locations of all existing businesses that might take customers away from each other.

3) Use a pencil and draw faint marks halfway between each pair of sellers. (If two sellers are located close to each other, you might treat them as one location and give each one half of the customers in that area.)

4) Adjust marks to reflect other considerations (if desired):

   a) If products are of different quality, move the marks to give the better one a larger share of the area.

   b) If transportation is not equal, adjust the marks so that the seller who has better access gets more area.

   c) If political or economic borders have an influence, adjust to give more area to the seller who gains.

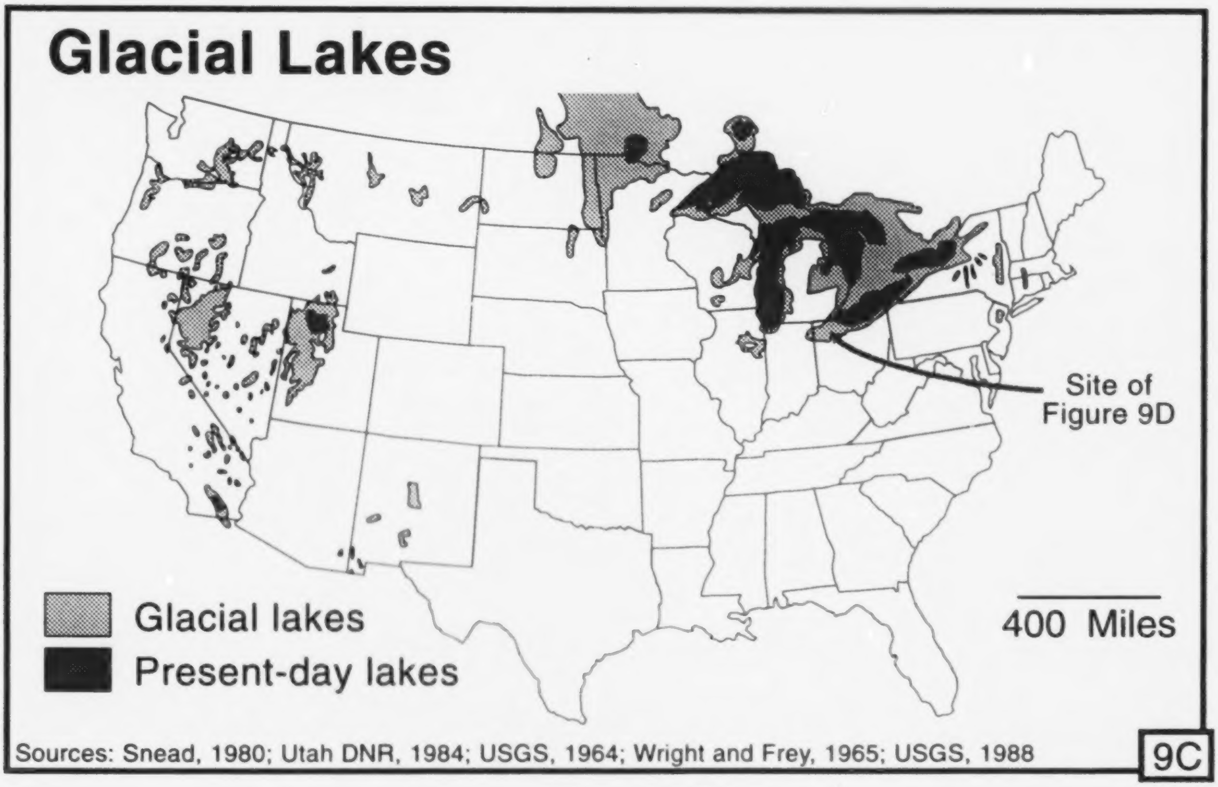
   d) If personal preferences or loyalties have an influence, adjust marks to give more area to the seller that customers seem to prefer.

5) Use those marks as starting points for *dividing lines*. These lines separate the people who are likely to go to one seller from those who are more likely to go to another seller. The goal is to make a map that shows the "territory" of each seller.

6) Count dots within the territory of each seller. Multiply the number of dots by the population represented by each dot. The result is an estimate of total population in the territory.

7) If you need a precise estimate, you could conduct a phone or mail survey to find out what proportion of the people in an area rent videotapes. The result is an estimate of the number of customers a seller is likely to have at a given location.

(This is adapted from ARGUS Activity N3; note that it teaches a theory (location allocation) and a skill (market estimation) as well as some facts about a specific place (Elmira).)


Glacial Lakes
Site of Figure 9D
▨ Glacial lakes
■ Present-day lakes
400 Miles

Sources: Snead, 1980; Utah DNR, 1984; USGS, 1964; Wright and Frey, 1965; USGS, 1988

9C

Borrow-pit lake
Vanlue
Village
Freeway
New streets and houses
Borrow pit, now filled with water

Source: USGS, Carey, OH, quadrangle, 1961 (photorevised 1980).

9D

TEACHER'S GUIDE FOR TRANSPARENCY 9C

Figure 3L shows the land that was covered by ice sheets during the Pleistocene period in geologic history. This time of cooler and wetter climate also featured lakes in many mountain and desert areas that are now dry and barren. As the ice melted, water often was trapped between the wall of ice and the hills that were beyond the farthest extent of the ice sheet. (These hills often helped block the ice from spreading further).

All of these Ice-Age lakes have one feature in common. The land that was covered by water tends to be flat. Wind and streams brought dust and sediment into the lakes, and that sand or mud settled to the bottom and filled the low areas. When these lakes dried and disappeared, the result is often a nearly flat plain.

> Activity: Put a few small objects into a bottle. Fill the bottle with muddy water and allow the mud to settle. Ask students why the mud tended to settle into the low areas around the objects. Then ask what they would see when the water is all drained away.
>
> Activity: If you are lucky, people will try to set a new land speed record on the Utah test track during your class. Ask students why the test track is there. The track is on the Bonneville Salt Flats, part of ancient Lake Bonneville. The Great Salt Lake is a remnant of this Ice-Age lake (see Transparency). Occasionally, heavy rains in the surrounding mountains will raise the level of the Great Salt Lake a few feet. This does not sound like much, but because of the flatness of the terrain, it can flood many square miles of land around the present lake (including the test track).

TEACHER'S GUIDE FOR TRANSPARENCY 9D

> Activity: the rectangular lake and nearby housing subdivision is not an isolated case. Find topographic maps for any flat area shown on Transparency 9C, and you are likely to see straight ditches, rectangular ponds, and other obviously artificial water features. This kind of exploration of "ordinary" landscapes is good balance for those map-interpretation workbooks that focus on canyons, ski slopes, and other spectacular terrain features.

This book has repeatedly said that the ability to apply information from a broad-scale thematic map to a narrow-scale reference map (and vice versa) is one of the key strategies for geographical analysis. This is the skill that makes thematic-map information accessible for people who are trying to get background to solve a local problem. Showing how it can be done in other landscapes is a way to focus on the skill without the emotional overtones and rhetoric that accompany a controversial local issue. At the same time, it engenders a willingness to evaluate sources of information in terms of their data integrity.

And that is the purpose of teaching geographical skills!

GLOSSARY AND INDEX

AAG -- the Association of American Geographers, which publishes the *Annals* and *The Professional Geographer* 8-5

absolute location -- location expressed in terms of mathematical coordinates 4-4

acre -- unit of area, 0.4 hectare, 1/640 of a square mile, 43,560 square feet, slightly smaller than a football field 4F

activity, student -- participatory learning experience 0-4

address -- location expressed as a street number 4-4

aesthetics -- a primary concern of the humanist *perspective* 1-3

agriculture -- producing food from domesticated plants or animals 1A, 1B, 2K, 7B

AGS -- American Geographical Society, publisher of the *Geographical Review* 8-5

Amazon Basin -- area drained by the Amazon River in South America 3-7

Anglocentrism -- focus on English-speaking people and their actions 4-6

applied geographer -- someone who uses geographical methods to do things 4-1, 8-6

ARGUS -- Activities and Readings in the Geography of the United States, a project to develop and test classroom activities for secondary schools 0-3

art -- using materials creatively to say something profound (as opposed to *design*) 3-4

at-risk population -- people who are vulnerable to a hazard 8E, 8F

authentic assessment -- evaluation of performance on tasks similar to the real-world situations in which the knowledge or skills are to be used 0-4, 7-8

automobile assembly plants 3Q

Behavioral objective -- educational goal stated in terms of the desired change in student behavior 7-2, 7-4, 8-8

Bloom's taxonomy -- categories to describe different kinds of learning 3-20, 7-2

Bosnia -- part of former Yugoslavia, site of a civil war in the 1990s 2-2, 2C, 2E, 8-3

bounded-area map -- map that uses lines to divide an area according to some criterion (contrast with *choropleth* and *isoline* maps) 3C, 3L, 3N

break-in-bulk point -- place where goods are moved from one mode of transportation to another (e.g. from a river barge or railroad to an ocean ship) 8-1

built environment -- landscape features built by people 3R

Capital -- political center of an area 0-2

capital -- tools and money used to make production more efficient 3-18

cartogram -- map that shows the amount or value of something in an area by distorting the size of the area 3O

cartographic convention -- generally accepted way to use symbols on a map . . . . . 3-15 cartography -- the art and science of making maps . . . 1-1

categorilla -- term coined for the largest feature in any category: the highest mountain, longest river, biggest ball of twine, etc. . . . 4-6, 7-7

causality -- the idea that one event may be the cause of another event . . . 4-1, 4-3

census -- official count of population, including age, income, occupation, etc. In the United States, the census is taken every ten years . . . 6-6

central place theory -- theory to explain the size and locations of *service centers* -- many scattered small places providing general services that are needed every day, up to a few large central places providing specialized services needed only occasionally . . . 3-12, 2G, 2H

Central Valley -- important farming area in central California between the Coast Ranges and the Sierra Nevada . . . 1-1

Chamber of Commerce -- local business organization that often produces community profiles to give to interested individuals . . . 4-12, 6-6, 6-8, 3B

chaos theory -- idea that big effects may have tiny, unpredictable causes . . . 4-2

checklist -- data form with labelled blanks to be filled in by the observer . . . 4-11

choke-point -- place where traffic is funnelled through a narrow strait, pass, or other feature that constricts traffic . . . 4-19, 4Q

choropleth map -- map in which political or census units are colored or shaded according to the amount of something in them; best used for ratios such as population density; the arbitrary borders of the map units can sometimes be misleading . . . 1-1, 1A, 1B, 4Y, 4Z, 6D

Civil War (1861-1865) -- war that occurred when people in southeastern States tried to secede and form their own country . . . 3-14, 3N, 4-22

classification -- putting things into categories of similar features . . . 4-8

climate -- "normal" weather in a place, both the average conditions and the extremes one is reasonably likely to experience over a period of time . . . 4I, 4J

climatic analog -- place that has a similar location on another continent and therefore has similar climatic conditions . . . 7-5, 8-4

cognitive psychology -- the study of how people learn . . . 2-9, 7-12

community profile -- concise description of the population, economy, and other relevant facts about a local community . . . 7-10, 3B, 7D, 7E

computer programs in geography -- programs that store data, arrange events, and do other tasks to help someone do or teach geography . . . 8-14

Confederacy -- the states that seceded from the Union in 1860-5 . . . 3-14

contour -- *isoline* separating higher from lower elevation . . . 7A

cooked data -- percentages, per-capita values, and other ratios that help put numbers into perspective (see *raw data*) . . . 1-1

Coriolis "Force" -- tendency for objects in motion on the surface of the earth to be deflected from an apparent straight path . . . 4G

Corn Belt -- region of family farms, from western Ohio to eastern Nebraska . . . 4R

correlation -- statistical measure of the relationship between variables; a high correlation means that a place with a high value on one map will probably also have a high value on the other map . . . 4-22

credibility -- likelihood of being believed . . . 1-7

creed -- a statement of basically unprovable faith . . . 4-1 cultural definition of resources -- idea that the people in an area define what things can or will be used as resources . . . 4-13, 8-2

cultural legacy -- persistent effect of the use of land by a particular culture . . . 4-14

curricular position -- time set for a subject in a weekly class schedule . . . 2-3, 6-1, 6A

Deductive logic -- moving "downward" from a general principle to a specific application . . . 1-4

deforestation -- removal of trees from an area . . . 3-7

Delta -- flat floodplain of the Mississippi in Arkansas, Louisiana, and Mississippi . . . 4X

density -- number of objects per unit of area . . . 1-2, 9-2

design -- using material efficiently to do something worthwhile for humans (as opposed to *art*) . . . 3-4

determinism -- idea that nature "determines" what people do in an area . . . 4-13, 8-3

dietary deficiency -- lack of an essential nutrient in what a person eats . . . 8-12

diffusion -- the spread of something through an area . . . 3-9

direction -- orientation of a path or sight-line with respect to north . . . 4E, 6I, 7A

distance -- separation of two locations, a *spatial primitive* . . . 4D

dogma -- belief that "this is absolutely true, period" (see *relativism*) . . . 3-19

dot map -- uses dots (or other repetitive symbols) to show the general pattern of something in an area . . . 4M, 4R, 4X, 7-5, 7B, 8A, 8C, 9A, 9B

Earthquake -- ground vibrations, often destructive, that occur when rocks slip along a geologic fault . . . 8-9, 8E, 8F

ecological fallacy -- presumption that all persons within an area have all of the traits that are typical there; a *census tract* may have a high average income and many domestic servants, but it is ecological fallacy to conclude that domestic servants have high incomes . . . 1A, 1B

empire -- large territory under the control of one political group . . . 3-15

engine of an activity -- the basic thing a student does to make a classroom or homework activity run . . . 0-4, 3-24

environmental conditions -- the mix of natural features such as climate, soil, and wildlife in a specific place . . . 3-11

environmental impact statement -- mandatory planning document that outlines the probable environmental effects of a proposed activity . . . 6-6

epidemiology -- study of the causes of diseases . . . 4-21

Erie Canal -- waterway that made it easier to travel from the frontier to New York than to any other city on the East Coast . . . 4-17

essay test -- set of questions that ask students to write answers in their own words . . . 7-9

ethics -- a concern of the humanist *perspective* . . . 1-3

etiquette -- rules about how to behave . . . 0-1

Eurocentrism -- focus on European people and their actions . . . 4-6

European explorers and settlers -- people who came to America from Europe during what European historians call the Age of Exploration . . . 7C

evaluation, student -- assessment of performance on a specific task . . . Chapter 7

evaluation, geographic -- opinion about a place . . . 3-3, 3-17, 3-19, 3-23, 7-1, 7-3, 7-9

BEST COPY AVAILABLE

Federal land ownership -- land owned by the Federal government rather than private individuals or other government agencies 3O

field trip -- excursion to make observations and test hypotheses in the world 7-10, 7F

flowline map -- map that varies the size of a line to show the volume of something moving along a route 8-4, 4S

fluid dynamics -- principles that govern the motion of fluids such as air or water 4-9

formal region -- group of places with similar features 4-20

frontier -- area where people are moving in, building homes, and starting farms and other businesses 3-14, 3M

frost-free season -- part of the year that has no significant risk of frost 3-14, 3J, 3K

functional region -- group of places linked together by a flow of something 4-20

GENIP -- Geographical Education National Implementation Project, to coordinate educational efforts of geographical associations 5-3, 5-4, 6-10

Geographic Information System (GIS) -- computer file of locations and their traits (e.g., ownership, climate, yield, family income, etc.) 4X

geographical irony -- fact that the very things that make a place good for some purposes can also pose a threat for others 4-24

geography -- scholarly discipline with focus on spatial patterns and links 0-2, 1-3

ghetto -- area a particular race or class of people is more or less forced to live (like "*tree*," it is a word with different meanings in different places) 3-7

GIGI -- Geographic Inquiry into Global Issues, an NSF-funded project to develop and test classroom activities for secondary schools 0-3

glacier -- moving mass of ice that forms in a cold, snowy environment 3-14, 3L, 9D

grade -- letter that indicates level of performance on a task or test 7-11

graffiti -- messages painted on walls, bridges, and other "public" places 0-1, 0A, 0B

Grand Canyon -- large gully (!) formed by the Colorado River 3-3

gravity model -- method of predicting the amount of traffic, phone calls, and other *spatial interaction* between places 3-8, 4-19, 3E, 3F

growing season -- length of time between the last killing frost of spring and the first one in autumn 3-14, 3J, 3K

guild -- medieval organization in which members train new apprentices to take their places when they end their careers 6-1

Harpers Ferry -- strategically important town where the Shenandoah and Potomac Rivers join and flow through a gap in the Blue Ridge 1C, 1D, 6F

hemisphere -- half of a sphere; also, half of the brain that appears to "focus" on specific kinds of mental tasks 2-9

hermeneutics -- attempt to understand how people get meaning from a text 3-2

history -- scholarly discipline with a focus on the influence of time 0-2, 1-3

Homestead Act of 1862 -- law granting land to settlers 4-14

HOTS -- high-order thinking skills -- synthesis, evaluation, and other cognitive activites that are "higher" than mere memorization 3-19, 3-20, 7-8

human-environment interaction -- the geographical theme that deals with the mutual influences between humans and their environment 3-9, 9-3

hypothesis -- statement about a possible relationship between phenomena 4-10, 7-10

Image -- scene, sound, or other sensory impression . . . 3-2, 3-3, 7-3

imaginary places -- places that do not exist; often used in instruction, though their effect often is to subvert the message . . . 4-6, 7-9

in-service training -- summer courses, workshops, and other educational activities for active teachers . . . 6-1

inductive logic -- thinking "upward" from specific *observations* to derive a general principle . . . 1-4, 5-5

industrial orientation theory -- idea that people tend to locate factories near the input or output that costs the most to transport . . . 1E, 1F, 1G, 1H

infrastructure -- canals, roads, powerlines, and other built features that support human activity in a place (some analysts include institutions such as welfare, schools, etc.) . . . 3-11, 4-17, 4-19

international rationale for geography -- knowledge about other places is useful in learning how to live in an interconnected world . . . 0-3

inventions -- new ideas that can result in new products, economic growth, and lifestyles . . . 4-23, 4Z

Islam -- one of the world's major religions . . . 2-2, 2D

isoline map -- map that uses lines to separate areas of higher value from areas of lower value . . . 2I, 3I, 3J, 3K, 3M, 4J, 4U

Japan-bashing -- blaming Japanese competition for the loss of jobs in the United States . . . 3-18

Land division -- method of marking land that is owned or controlled by specific individuals . . . 3-11, 4-14, 4-15

land use -- changes people make and structures they build in order to use land . . . 3-11

language -- using words and other symbols to communicate images, theories, and value judgments . . . 3-1, 4-5, 7-2

latitude -- angular distance north or south of the Equator . . . 4-4, 4-8, 4A, 7-4

layout devices -- boxes, tinted pages, special type fonts, and other mechanical devices to help a reader stay oriented in a book . . . 2-5

learner outcomes -- statements of desired student knowledge, skills, and attitudes in a subject such as geography . . . 1-8, 5-3, 5-8, 6-7, 7-4, 7-12, 9-2

learning style -- preferred method of learning, reading, experimenting, etc. . . . 7-12

legacies (relics) -- landscape features left by previous inhabitants of a place . . . 4-14

levee -- long dam to protect an area from flooding . . . 8-2

link -- something that connects two places together . . . 4-15

local interactions -- interplay of various factors in a specific place . . . 2-1, 2-4

local rationale for geography -- knowledge about local places is useful in making them more safe, fair, beautiful, etc. . . . 0-3

location -- position in space, a cornerstone geographic idea . . . 0-3, 1-3, 4-3, 9-3, 4B, 4C

location rent theory -- tries to explain the pattern of land value in an area in terms of locations with respect to markets, resources, etc. . . . 2-8, 3-11

location-allocation analysis -- deciding how many of something (such as convenience stores) to put in an area and where to put them . . . 3-12, 9-2

locational advantage -- having a better site and/or situation . . . 8-1

Malaria -- disease carried by mosquitoes in hot and wet places 4-21

mantra of the geographically ignorant -- "if it works for them there, it ought to work for us here" 4-18

map pattern analysis -- study of the arrangement of features in order to get ideas about what might cause them 3-13, 3-16

map pattern correlation -- mathematical method of comparing map patterns to test the degree of similarity 4-22

matrix -- x-y grid of cells with labels on the columns and rows 2-5, 8-4, 8-10, 2J

Maumee Lake Plain -- flat bottom of a former glacial lake in northwest Ohio 9-3

mental map -- conceptual image of the spatial arrangement of something 3-14, 7-9

moisture balance -- balance between precipitation (moisture income) and evaporation (moisture outgo) in a place 3-14, 3I

multiple-choice test -- set of questions that ask students to identify which of several alternative responses is correct 7-7

musical theme -- sequence of notes that recur in a musical composition and help tie it together 5-2

National Geography Standards -- list of skills and learner outcomes students should master at particular grade levels 1-7, 5-3, 5-5, 5-8, 6-7, 6-10, 8-8

Native Americans -- people descended from the Cherokee, Dinee, Lakota, Seneca, and other groups who lived in North America before European explorers and settlers came 3C, 3D

NCGE -- National Council for Geographic Education, which publishes the *Journal of Geography* and other teacher-oriented materials 3-10, 8-6

NGS -- National Geographic Society, which publishes the *National Geographic* and many other print and film products 8-5

Nile River -- longest river in the world, in northeast Africa 4-21

novel -- fictional book, often set in a real place and therefore interesting from a geographic perspective 6-9

Observation -- acquisition of a visual image or other fact about a place 3-20, 6-8

OK-but-itis -- "disease" that causes textbooks to grow disproportionately large as people add "just a little bit" about a whole host of topics 6-11

overhead transparency master -- drawing that can be made into a transparency for projection in a classroom 0-3, 3-9, 3-15, 3-22

oxisol -- nutrient-poor red soil, usually found in hot and humid climates 3-11

Paradigms, positivism, post-modernism -- key words in geographical discussions about how people learn about and live in places 3-9, 8-13

paradox of the aggregate -- idea that what works for a few people in an area may not work if many people try to do it there 9-1

pedagogical theme -- idea that permeates a discussion and holds it together by defining what ideas are important 5-2, 5-5, 6-7

pediment -- "apron" of eroded rock around a mountain in a desert region 4-10

per-capita value -- amount per person, one way of putting raw numbers into perspective (see *raw data*) . . . . . 1-2 perception -- what someone *thinks* is happening 8-12

perspective -- context for understanding an *observation*; also, a specific way of asking questions 1-1, 1-8, 6-7, 7-12

place -- the human and natural phenomena that give a location its unique character; a location after something gives it special meaning 4-3, 4-7, 8-2

placename -- conventionally used term to identify a specific place 7-3

placename bias -- choosing places that are not representative of the full range of real locations in the world 4-6

plantation -- specialized farm that usually requires many workers (before the mid 1800s. these were often forcibly enslaved persons) 4X

Platte River -- historically important river that flows from the Colorado Mountains to Omaha, Nebraska 6-8

playa -- frequently dry "lake" in a desert region 4-10

Pleistocene -- "Ice Age" in recent geologic history 3-14, 3L, 9C

point-symbol map -- map that uses dots or other symbols to show what occurs at specific points 0A, 1E, 4E, 4I, 4K, 4O, 9A, 9B

population pyramid -- graph of the number of people in age-sex categories 4-11, 7-5

portfolio -- collection of previous tangible work, used in seeking a new job 6-5, 6-6

possibilism -- the belief that people can do whatever they want in an area, that technology can overcome any environmental limitation 8-3

pre-service training -- courses and curricula designed for future teachers 6-1

precipitation -- rain, snow, and other forms of water falling onto the earth surface 4-9

process -- a cause-and-effect connection that scientists try to discover 1-3

profile, community -- concise description of the population, economy, and other relevant facts about a local community 3B, 7-10, 7D

profile, terrain -- "side view" of the land in an area 4N, 6E, 6F

proportional-symbol map -- map that varies the size of a circle or other symbol to show the quantity of something at a point or in an area (also called graduated-symbol map) 4I, 4P, 4T, 6C

Public Land Survey -- system of dividing land into square Townships and square sections with straight lines 4F

pure geographer -- uses geographical methods to understand the world 4-1, 8-5

Range -- distance a typical person is willing to travel to get a particular good or service 4-14

rationale -- reason for doing a particular thing, such as studying a subject such as geography or refusing to grant a request 0-2, 0-3, 1-3, 6-2

raw data -- population counts, production amounts, rainfall measurements, and other absolute numbers (see *cooked data*) 1-1

reasons, reasonable and unreasonable -- explanations for locations of things 4-2

redlining -- drawing lines on a map to delimit areas where a bank might refuse to grant loans 3-17

reference map -- map that shows the locations of various things in an area that is usually fairly small (contrast *thematic map*) 2-2, 2C, 2K, 4-13, 8-8

region -- sizeable area with generally similar appearance or internal links that tie it together . . . . 4-20, 6-7 regional geography -- study of interaction of factors at a local scale 2-1, 2-4, 8-7, 2I

relative location -- location expressed in terms of relations with a known location 4-4

relativism -- belief that "nothing is true, period" (see *dogma*) 3-19

resource -- something that people in an area have learned how to use 4-13, 8-2

resume -- list of qualifications and experience, used in seeking a new job 6-5

role-playing simulation -- classroom activity in which different students are assigned different roles and asked to interact 3-19, 3-24

Safety net -- system of insurance and/or public subsidy to help people affected by accidents, unemployment, or other catastrophes 4-23, 4Y

Sahara -- desert in northern Africa 4-20, 4J

satellite image -- photograph or electronic image taken from a satellite in orbit 3-10

scale, map -- mathematical relationship between the size of a map and the part of the real world it shows 7-3, 1C, 1D

scientific method -- term for the idea that scientists proceed in an orderly manner to gather observations in order to test hypotheses .3-20

scissors -- tool with two opposing blades that cut better when working together than they could working separately 2-1, 2A, 5-6, 6-4, 6-7, 8-2, 8-7

sequent occupance -- sequence of ways in which people occupied land at various times in the past; many present-day landscape features are left from previous occupance 4-14

sickle-cell anemia -- disease associated with malaria in tropical regions 4-21

site -- all local conditions (terrain, climate, soil, vegetation, energy/mineral resources, etc.) that affect what people can do in a place 5B, 8-1, 8-2, 9-1

situation -- connections (transportation routes, corporation ties, political associations) between a place and other places 5B, 8-1, 8-2, 9-1

skill -- ability to perform a specific task, such as locating a place or measuring distance between places 7-9

slaves -- people who are "owned" by and forced to work for other people 4X

slide -- small transparent photograph that can be projected on a classroom wall or screen 2-6, 3-4, 3-21, 6-7

soil survey -- book with detailed maps and tables about the soil, climate, and other *resources* of a county 6-6, 6G

spatial -- refers to distances, directions, areas, and other aspects of space 1-3

spatial imbalance (or bias) -- tendency for features to be found in one part of a map rather than throughout the area 3-13

spatial interaction -- traffic, phone calls, and other flows of people, goods, or information between places (see *gravity model*) 3-8, 4-19, 3E, 3F

spatial primitive -- basic spatial concept, such as location, distance, direction, or enclosure 4-5

spreadsheet -- computer program that puts data in rows and columns for analysis 4-12

standardized test -- test that is given to a large number of people and can be used to compare schools, states, or even countries 7-10

standards, educational -- statements of desired learner outcomes in a subject such as geography 1-7, 5-3, 5-8, 6-7

strand -- one part of a rope or other woven object . . . . .3-20, rest of Chapter 3, 6-7, 7-1, 7-8 street pattern -- arrangement of roads in an area 3H

subregion -- smaller part of a region 4-22

Subsidence -- zone of sinking air about 28 degrees of latitude north or south of the zone of Instability near the Equator 4-8, 4H

Tax deduction -- reduction of taxable income for business expenses 6-7

teachable moment -- time when students are primed top learn a specific idea 8-10

territorial marker -- landscape feature that marks the edge of someone's space 0-1

test -- method of evaluating mastery of a knowledge or skill 2-8, 7-1

thematic map -- map that shows the spatial arrangement of a few things in an area (contrast *reference map*) 2-2, 2D, 2L, 4-13, 7-5, 8-8

theme -- idea that permeates a discussion and holds it together by defining what ideas are important 5-2, 5-5, 6-7, 5A, 5B

theory -- statement to explains something (or at least allow us to predict something that may happen under similar circumstances) 3-8, 7-1, 7-3

Tokyo transit region -- area connected by subways and bus lines in Tokyo, Japan 4-20

tolerance -- willingness to "put up with" other ideas or people 3-19

topical geography -- study of the spatial patterns of various phenomena, usually at a broad scale (see *thematic map*) 2-2, 8-7, 2I

topographic map -- a detailed reference map, published by the United States Geological Survey, that shows terrain, water bodies, roads, houses, other buildings, and many other features 1C, 6-6, 7-4, 7A

tragedy of the commons -- idea that what works for a few in an area may not work if there are many there 9-1

transect -- line along which an observer records data 4-12

tree -- an example of a word with different meanings in different places 3-7

trivia -- isolated and therefore meaningless facts 0-2, 2-9, 3-6, 5-7, 7-1, 7-7, 8-14

Unemployment benefits -- payments to unemployed people 4-23, 4Y

URISA -- the Urban and Regional Information Systems Association, which publishes a *Proceedings* of each national meeting 8-6

Value judgment -- opinion about the beauty, truth, morality, or importance of something 3-2, 3-17, 3-19, 3-23, 7-1, 7-10

vernacular theory -- explanatory idea that is believed by the people in an area 3-10

West Bank -- disputed area between Israel and Jordan 3-14, 8C, 8D

where -- a little word with big meanings 1-5

world-class geography -- geographic knowledge and skills that are equal to the average for peer countries around the world 1-8

Yellow pages -- listing of business addresses and numbers in a telephone book (or a CD-ROM), useful in making a *community profile* 6-6, 6B

Zaire Basin -- area drained by the Zaire River in central Africa 4-21

INDEX OF GEOGRAPHIC LOCATIONS

Africa 2D,F,I, 3-15, 3P, 4-8,21, 4T-V
Alabama 3-6
Alaska 4-23
Amazon Basin 3-4, 3-7, 4-20
Andes Mountains 8-6
Arabia 4-9
Argentina 1J
Arizona 3A, 4D
Arkansas 4-12, 4S
Asia 2D, 3G, 3-12, 4-10, 8-6
Australia 3-6, 4-9, 4-10, 4-18
Baghdad 3-6
Baltimore, MD 1F, 4-18
Bangladesh 1J
Bella Vista, AR 4-12
Bethesda, MD 6-8
Bolivia 4-16
Bosnia 2C, 2E, 3-12, 8-3
Brazil 3-7, 1F
California 1-1, 1A,B, 3-6, 8E,F
Canada 1-7, 1J, 3-7, 3-10
Cairo, Capetown 4-12
Chicago, IL 1F
China 3G, 7-7
Cleveland, OH 1F
Delaware 4-16
Deming, NM 4-12, 6B
Denver, CO 2H, 3-8
Detroit, MI 1F, 3-12, 3H
Elmira, NY 9A, 9B
England 8-6
Europe 1E, 3-6, 3-12, 4-17, 4Q
Florida 9-5
Georgia 4O
Germany 1J, 4K, 8-12
Gibraltar 4-19, 4Q
Grand Canyon 3-3, 3A
Harpers Ferry, MD 1C, 1D, 6F
Hawai'i 4-23
Houston, TX 4-18
Indiana 9-4
Indonesia 3-11, 4-12
Iowa 4K, 7-3
Iran 4-11
Israel 3-14, 8C, 8D
Java 3-11
Japan 1J, 2-6, 2L, 3-18, 3-24, 4-12, 8-6, 8-12
Jordan 3-14, 8C, 8D
Kansas 0-1, 4P, 3-4, 3-6
Kazakhstan 3-12
Kentucky 3-18, 4-16
Kuwait 4-11
Las Vegas 4-10
London 2-6
Los Angeles, CA 0-1, 0A
Louisiana 3K, 8-1
Lowell, MA 8A, 8B
Magnolia, MS 6-8
Maine 4-23
Malaysia 4-16
Maryland 6-8
Massachusetts 8A, 8B
Mexico 1-4, 4-16
Michigan 1F, 3-7, 3-18
Minneapolis, MN 4-18
Minnesota 1F, 2-7
Mississippi 2-6, 6-8
Missouri 3-7
Mongolia 4-12
Moscow 3-4, 4-18, 4-20
New England 2-5
New Guinea 4-9
New Orleans, LA 8-1
New York 4-17, 4M, 4N
New Zealand 4-10
Nile River 3-5, 4-10, 4-21
North America 3C, 3-14
Norway 3-24, 4-10
Ohio 3-6, 4-16, 9-4,5,6, 9D
Oregon 3-7, 8-14
Palestine 3-14, 8C, 8D
Palm Springs, CA 4-12, 6B
Paris 3-5
Pennsylvania 3R, 4-17, 4N
Peru 4S
Philadelphia, PA 4-17, 4-18, 4M
Phoenix, AZ 4D
Pittsburgh, PA 1F
Platte River 6-8
Portland, OR 4-18
Portugal 3-6
Russia 3-24, 3G
Rwanda 3-23, 4-11
Saint Louis, MO 3-12
Salt Lake City, UT 4-24
San Diego, CA 3-12, 4-18
Savanna, GA 4O
Siberia 3-7, 3G
Singapore 4-12
Somalia 4-11
South America 3-7, 7B
South Carolina 3K
South Dakota 3-6
Soviet Union 3-12
Sumatra 3-11
Tennessee 2-6
Texas 3-7, 4-16
Thailand 2-5
Tokyo 2K, 4-20
Toronto 2-5
United States 1A, 1B, 3-14, 3I-O, 3Q, 4-21
Utah 4-24, 8-3
Washington, DC 0-1, 3-8, 6F, 8-5
West Virginia 0-1, 3-7, 4-23
Western Europe 1E
Yakut homelands 2-5
Wyoming 4-23
Zaire Basin 4-21
Zambia 4-18